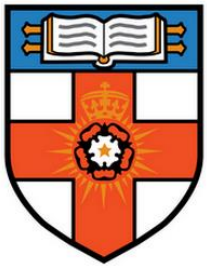
Typological Universals of Relative Clauses

with Reference to Korean as a Foreign Language



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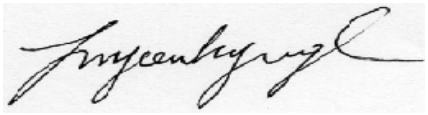
Signed: 

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Abstract

This thesis examines the applicability of typological universals of relative clauses, such as the Noun Phrase Accessibility Hierarchy (NPAH; Keenan and Comrie, 1977), to Korean as a foreign language. The NPAH is an implicational hierarchy explaining the cross-linguistic accessibility of different noun functions to relativization. The focus of the experimental investigations is thus on how syntactic and semantic aspects of Korean noun-modifying clauses intersect with the typological universals of relative clauses and whether we can verify the effect of the NPAH on Korean as a foreign language.

A series of computer-assisted comprehension and production experiments demonstrated that, first, Korean language learners' performance was significantly affected by multiple factors aside from the NPAH, such as types of relative clauses (RCs), learners' first language (L1) background, and animacy of the head noun. Second, animacy was foregrounded as a salient semantic cue in both processing and producing relative clauses; however, the contribution of RC types and L1 was greater than animacy, implying syntactic primacy over semantic primacy in relativizing different noun functions in Korean. In addition, the effects of the multiple factors are dissimilar in different L1 groups.

The results indicate that the Accessibility Hierarchy (AH) of relativized grammatical functions was not found in Korean as a foreign language. The current study therefore proposes that the implicational hypothesis of accessibility to relative clauses is not universal. The significance of the experimental findings on language-specific characteristics is also discussed with respect to the filler-gap dependency and the argument dependency.

This thesis is dedicated to my parents,

Mun-hwan Ju and Se-sun Kim,

for their unconditional love, endless support, and great encouragement.

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CHAPTER 1

Introduction

1.1 Overview: the NPAH effect

The nature of language acquisition is of interest to anyone curious about what is common to all languages, that is, Language Universals. As Comrie (1984) has noted, second language research can provide an empirical check on the merit of universalist theories. In other words, the discovery or disruption of valid generalizations about the nature of language might sometimes be greatly informed by second language research.

The aim of this thesis is to examine whether two implicational hypotheses of relative clauses in typological universals, the Noun Phrase Accessibility Hierarchy (NPAH) and the Markedness Differential Hypothesis (MDH), apply to Korean as a foreign language, both in processing and production of relative clauses (RCs)[1]. By typological universals, I refer to language universals developed within a Greenbergian approach. To investigate the applicability of these typological universals to Korean, I focus on multiple factors affecting RC processing and production, such as prenominal and head-final features of relative clauses in Korean,

[1] With regard to language learning and teaching, a clear distinction should be made between second language (SL) and foreign language (FL) based on the language learning environment outside of the classroom. However, the research target of the thesis is language learners' instantaneous processing and production of a certain form, which is separated from the procedure of language learning or acquisition. Therefore, distinguishing the two learning environments is beyond the scope of this research and SL and FL are used interchangeably in this thesis. A first language and a second language are abbreviated as L1 and L2 respectively.

language transfer, animacy of the head noun, and the filler-gap hypothesis, since they have been often discussed in literature either jointly or independently in relation to the processing and production of relative clauses.

Two of the most distinctive approaches to the study of language universals have been developed by the linguists Noam Chomsky and Joseph Greenberg. The Chomskyan approach favours the intensive analysis of one language as part of an effort to identify abstract principles of a Universal Grammar, whereas the Greenbergian approach favours cross-linguistic comparisons (Comrie, 1981). The Chomskyan approach has advanced many claims about language structure, language acquisition, and linguistic theory, and led to several empirical investigations in second language acquisition (SLA), which extend further to the progress of adults' learning a second language. On the other hand, the Greenbergian approach has advanced theoretical assumptions on cross-linguistic regularities and provided the basis for several studies on grammatical theory and language acquisition. The assumptions on cross-linguistic consistencies derived from investigation with the Greenbergian approach are often referred to as typological universals (Croft, 2003: 4-6). Researchers of typological universals attempt to define linguistic universals by examining a selection of structures from a wide range of diverse languages from different language families, in order to form a broad base of cross-linguistic data. For example, the Greenbergian approach to typologically common patterns encouraged second language researchers to investigate potential language transfer which might be caused by typological differences between two languages and to understand the cross-linguistic influences of differences in second language acquisition.

In this regard, an extended look at research on relative clauses in depth to test typological universals is particularly prevalent among second language researchers

for several reasons. First, the number of studies and hypotheses in this area is rather large: the Noun Phrase Accessibility Hierarchy (Keenan & Comrie, 1977), the Perspective Shift (MacWhinney, 1982; MacWhinney & Pleh, 1988), the Phrase-Structural Distance Hypothesis (O'Grady, 1997), the Dependency Locality Theory (Gibson, 2000), the Similarity Effect (Gordon, Hendrick, & Johnson, 2001), the Statistical Regularity of Word Order (MacDonald & Christiansen, 2002), the Filler-gap Domain Hypothesis (J. Hawkins, 2004), and the Probabilistic Models (Hale, 2006; Levy, 2008). Second, several studies have involved target languages other than English (English: Wanner & Maratsos, 1978; King & Just, 1991; Gibson, 1998; Grodner & Gibson, 2005; French: Holmes & O'Regan, 1981; R. Hawkins, 1989; German: Mecklinger, Schriefers, Steinhauer, & Friederici, 1995; Schriefers, Friederici, & Kuhn, 1995; Dutch: Frazier 1987; Mak, Vonk, & Shriefers, 2002, 2006; Italian: Croteau, 1995; Swedish: Hyltenstam, 1984, Basque: Carreiras, Duñabeita, Vergara, Cruz-Pavía, & Laka 2010; Swahili: Thomas, 2011). Third, recent empirical findings on the SLA of head-final East Asian RCs are far from conclusive compared to the RCs of European languages (Japanese: Tarallo & Myhill, 1983; Kanno, 2000, 2001, 2007; Roberts, 2000; Ishizuka, Nakatani, & Gibson, 2003; Miyamoto & Nakamura, 2003; Ozeki & Shirai, 2007b; Yabuki-Soh, 2007; Hasegawa, 2007; Ueno & Garnsey, 2008; Chinese: Hsiao & Gibson, 2003 ; Yip & Matthews, 2007; Korean: O'Grady, Yamashita, Lee, Choo & Cho, 2000; O'Grady, Lee, & Choo, 2003; Lee & Lee, 2004; Kwon, Polinsky, & Kluender, 2006; Jeon & Kim, 2007). Fourth, such work is related in fundamental ways to work in other areas of linguistics, such as syntactic typology and psycholinguistics (see J. Hawkins, 2007).

Particularly, the typological generalization of relative clauses called the Noun Phrase Accessibility Hierarchy (NPAH) Hypothesis, together with the Markedness

Differential Hypothesis (MDH), has long been controversial in the field of second language acquisition (SLA), and empirical studies of such typological assumptions in SLA have fuelled much of the debate recently. The NPAH is an implicational hierarchy proposed by Keenan and Comrie (1977) that illustrates a cross-linguistic consistency regarding the type of RCs that a language allows. Keenan and Comrie (1977) sampled relative clause constructions from about fifty languages and, based on this data, they formulated the implicational hierarchy of relativized grammatical functions for all languages as Subject > Direct Object > Indirect Object > Oblique > Genitive > Object of Comparison. Cross-linguistically, all languages should be able to relativize subject and if a language can relativize a position lower in the Accessibility Hierarchy (AH), it can always relativize positions higher up, but not vice versa. Although the NPAH was initially proposed as a typological universal of RC formation, it was later extended to the order of difficulty in acquisition and processing of RCs under the Markedness Differential Hypothesis (MDH) (Eckman, 1977, 1985a; Eckman, Bell, & Nelson, 1988) in second language research. Therefore, with regard to the MDH, the NPAH does not only predict which constituents can be relativized but also implies that the further constituents are to the left, the easier and faster they are acquired and processed. Comrie (2007: 304) called such extension "the NPAH effects", distinguishing it from the original typological generalization of the NPAH; although the terms 'NPAH' and 'NPAH effect', are sometimes used interchangeably in this thesis.

However, it has been controversial whether the formation and acquisition of East Asian RCs follows the hierarchy and this question has attracted much attention recently. The target languages tested to prove the typological assumptions of relative clauses so far have been mainly English and European languages. The results of

studies on these languages have been mostly supportive of the NPAH effect, and it seems that general consensus has been reached regarding the effects of NPAH in the acquisition of relative clauses in English and other European languages, such as Italian (Croteau, 1995), French (R. Hawkins, 1989), and Swedish (Hyltenstam, 1984). However, the number of studies carried out to examine typological universals of relative clauses in East Asian languages, such as Korean, Japanese, and Chinese, is still small compared to similar studies in European languages. Moreover, empirical SLA studies in such languages have consistently reported conflicting results (Tarallo & Myhill, 1983; Matthews & Yip, 2002; O'Grady, Lee & Choo, 2003; Ozeki & Shirai, 2007b; Jeon & Kim, 2007). Thus, typological universals of relative clauses have to be tested against typologically diverse languages including Korean.

The second motivation is that it is unclear what the Accessibility Hierarchy really operates over since the hierarchy was initially proposed as a strong descriptive generalization on relative clause formation. Various factors, such as grammatical functions of head nouns, thematic roles of entities and semantic/pragmatic relations have been mentioned in literature although their crosslinguistic influence has yet to be completely proved. Moreover, it is also not clearly identified what exactly formulates the Accessibility Hierarchy. Although the NPAH has often been interpreted as claiming that grammatical relations determine accessibility to relativization, what Keenan and Comrie (1977) initially proposed is that the Accessibility Hierarchy reflects the psychological ease of comprehension (Keenan & Comrie, 1977: 88). In other words, the preferences for noun phrases (NPs) higher in the Accessibility Hierarchy arise from the cognitive mechanisms that underlie human sentence processing. However, if we thus attempt to explain the processing advantage of subjects by appealing to the ease of processing in terms of the

fundamental psycholinguistic principles, we might end up with complete circularity. For this reason, the Accessibility Hierarchy is in danger of overgeneralization and the ultimate explanation of the Accessibility Hierarchy thus still remains an open question.

1.2 Relative Clause Constructions in Korean

Korean is a particularly interesting target for investigating typological universals of relative clauses. Korean is a morphologically an agglutinative language with a Subject Object Verb (SOV) constituent order (Sohn, 1999). As will be discussed in Chapter 2 in more detail, due to its agglutinative morphological characteristics and the typological difference in basic word order, the Korean relative clause construction has the following characteristics: (a) it involves prenominal modification; (b) it involves a marker of relativization; and (c) there is no overt relative pronoun between the relative clause and its head noun.

As opposed to RCs in European languages, Korean exhibits quite a large degree of restrictive semantic and pragmatic constraints on RC construction. Recent research, much of which has focused on the RCs of East Asian languages, has argued that these RCs do not follow the same typological generalizations as those of European languages. In this respect, Comrie (1996, 1998) made an interesting proposal that the RCs of East Asian languages, such as Japanese, Chinese and Korean, should be classified as attributive clauses[2]. He argued that these languages do not have a

[2] Attributive clauses in Korean may or may not contain a gap. If they contain a gap, then they instantiate externally-headed relative clauses (RCs), which contain an empty category that is co-indexed with the head noun (i.e., the noun that an RC modifies). If they do not contain a gap, then they instantiate gap-less noun-modifying clauses (NMCs) or nominalized clauses that occur in subject or object position (Kim, 2013). The difference between RCs and gap-less NMCs is illustrated in the

distinct RC construction but a general noun-modifying clause construction, which is interpreted by trying to find a semantically and pragmatically plausible relation between the modifying clause and head noun. It follows from this that such languages should lack syntactic constraints on accessibility whereas they might have quite restrictive semantic and pragmatic constraints. According to Comrie (2007), pragmatically attributive RCs are neutral to the hypotheses for the NPAH (effect), which are primarily built upon grammatical functions such as subject and object, and there is thus no prediction for an advantage of subject RCs over object RCs. In this respect, Ozeki and Shirai (2007a) argued that the ease of comprehension or formation of noun-modifying clauses may instead depend on whether speakers of the language can readily establish a plausible interpretation of the clause. These peculiar features of RC construction in Japanese, Chinese and Korean seem to be cross-linguistically uncommon, and therefore, investigating the NPAH effect on L2 Korean RCs in connection with Japanese and Chinese would help us reveal underlying factors which formulate or enhance the typologically-specific inconsistency of the NPAH effect on East Asian languages. However, Korean relative clauses have received less attention than their counterparts in Japanese and Chinese, and not much experimental work has been done on processing and production of relative clauses in Korean. In this thesis, I attempt to fill this gap by examining the processing and production of Korean relative clauses by Korean native speakers and three learner

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following examples (a) and (b) respectively (Here, '*e*' stands for a gap or an empty category that is co-indexed with the head noun of an attributive clause):

e.g. (a) [e_i kohyang-ul ttena-n] salam$_i$
hometown-Acc leave-Past Rel person
'the person who left his hometown'
(b) [John-i kohyang-ul ttena-n] sasil
John-Nom hometown-Acc leave-Past Rel fact
'the fact that John (has) left'

groups from typologically different L1 backgrounds - Japanese, Chinese and English speakers who are learning Korean as a foreign language.

1.3 Aims and research questions

Accordingly, the primary aim of the thesis is to reconsider the implicational hypothesis of relative clauses (RCs) in typological universals, the Noun Phrase Accessibility Hierarchy (NPAH), along with the Markedness Differential Hypothesis (MDH), with reference to Korean as a foreign language from three perspectives, which current experimental research on relative clauses generally overrates, and for which data is so far insufficient. These perspectives are:

- A focus on language competence: The aim is to observe not just syntactic analyses of RC constructions with regard to typological universals, but whether or how the typological universals are interdependent in overall psycholinguistic competence, both RC perception and production.
- The inclusion of multiple factors: The aim is to investigate multiple factors affecting RC processing and production and to fill the research gap of typological universals in East Asian languages by linking the findings to conflicting results reported in previous studies.
- A cross-linguistic study: The aim is to provide cross-linguistic evidence for or against the applicability of typological universals to Korean as a foreign language.

To achieve these aims, the following research questions will be investigated:

(1) Do Korean native speakers and learners of Korean language process and produce Korean RCs in the order predicted by the NPAH effect? In other words, is the NPAH effect observed in processing and production of Korean RCs across both L1 and L2 Korean?

(2) Do L2 learners of Korean from typologically different L1 backgrounds, such as Japanese, Chinese, and English speakers, comprehend and form Korean RC constructions similar to the pattern observed in L1 Korean native speakers? If not, do types of relative clauses and/or first language backgrounds, as well as animacy, affect such results?

(3) Finally, is NPAH more language-specific than typologically universal?

To answer these questions, I will explore how morpho-syntactic and semantic-pragmatic aspects of Korean relative clauses intersect with typological universals in the processing and production of Korean as a foreign language. Comrie's claim of Korean noun-modifying clauses as attributive clauses will be finally evaluated with reference to RCs in other languages.

1.4 Outline of the thesis

This chapter has set out the research questions after a brief overview of the NPAH and the MDH and after the idenfication of certain gaps and shortcoming appeared in previous research that need filling. Subsequent chapters of this thesis are organised into 6 parts as follows: Chapter 2 details relative clause (RC) construction and introduces typological characteristics of Korean and English relative clauses with reference to word-order typology. Chapter 3 addresses two implicational hypotheses

in typological universals of relative clauses, the Noun Phrase Accessibility Hierarchy and the Markedness Differential Hypothesis, including Comrie's new typology of noun-modifying clauses in East Asian languages. Previous cross-linguistic investigations of relative clauses in European and East Asian languages are summarized together with some controversial issues and hypotheses relevant to the experiments. Chapters 4 and 5 report experimental findings and discuss the central issue of the thesis, the contribution of multiple factors in processing and production of relative clauses in L1 and L2 Korean. These chapters are structured similarly: first a context for the experiment and its hypotheses are given, followed by the method, then the results, which are interpreted and discussed, and interim conclusions are drawn. Experiment 1 (Chapter 4) investigates the reaction times for processing six different types of Korean relative clauses across four different L1 groups including a control group of Korean native speakers[3]. The main questions are whether participants from different L1 backgrounds process six different types of Korean RCs similarly in the order predicted by the NPAH effect and whether control factors of the experiment such as animacy, RC types and L1 show any significant effect on the results of the experiment. Based on the reaction time to object RCs in comparison to subject RCs, I argue that the linear distance between the head noun and the gap shows a processing advantage for object RCs. I also propose that the Linear Distance Hypothesis serves as a prior processing constraint on filler-gap dependencies. It is followed by discussion of the relative influences of multiple factors, excluding the NPAH effect, over the processing of Korean RCs. Experiment

[3] The control group in this thesis refers to the group of L1 Korean-speakers, which is compared to three different L1 groups: Japanese-, Chinese-, and English-speaking L2 learners of Korean. The reaction time (Experiment 1) and the targetlikeness of the responses (Experiment 2) of the control group are used as reference performances in this study when the effects of RC types and animacy over L1 are evaluated.

2 (Chapter 5) presents a regression analysis on coded spoken data from the elicited Picture Description Tasks. It explores the relative weight of the multiple control factors in oral production of Korean RCs, in comparison with the results from the Listening Comprehension Tasks (Experiment 1), in which things are more transparent: if the learner cannot form a RC, this is evident in nontargetlike surface forms[4]. The results of Experiment 2 will be compared to Experiment 1 to reveal and clarify ambiguity underlying the methodological issues and the difference of processing and production of RCs in Korean. Finally, Chapter 6 provides general discussion on multiple factors affecting processing and production of Korean RCs in L1 and L2 Korean and the implications of the experimental findings with reference to Comrie's new typology.

[4] The term 'targetlikeness' in this study refers to how grammatical, accurate and task-sufficient the participants' responses were. 'Targetlikeness' therefore refers to responses which were both native-like and which conformed to the design of the experiment. See Section 5.2.3 for more information regarding 'targetlike and nontargetlike responses'.

CHAPTER 2

Typological characteristics of relative clauses in Korean

2.1 Introduction

This chapter defines relative clause (RC) constructions and describes characteristics of relative clauses in Korean from the view of typological universals (Greenberg, 1966; Lehmann, 1978; Comrie, 1981; J. Hawkins, 1983; Croft, 1990).[5] Typological universals are based on data in that they are derived from an analysis and comparison of a wide range of cross-linguistic data. Since relative clauses show considerably different syntactic manifestations across languages, the analysis is made by finding out how each language constructs the same semantic function of relative clauses. With regard to the semantic function, Keenan and Comrie (1977) suggested that the relative clause is constructed universally in the following manner:

> We consider any syntactic object to be an RC if it specifies a set of objects (perhaps a one-member set) in two steps: a larger set is specified, called the *domain* of relativization, and then restricted to some subset of which a certain

[5] The term "relative clause" is sometimes used to refer to the entire NP which contains a clausal modifier, including the head noun. In this chapter, the term "relative clause (RC)" refers only to the clausal modifier; and the NP which contains a relative clause is called a "relative clause construction" to avoid terminological ambiguity. See Section 2.2 for more information.

> sentence, the *restricting* sentence, is true. The domain of relativization is expressed in surface structure by the *head NP*, and the restricting sentence by the *restricting clause*, which may look more or less like a surface sentence depending on the language (Keenan and Comrie, 1977: 63).

However, languages adopt different strategies in the construction of relative clauses to achieve the same semantic function. Therefore, especially in second language syntax, the main features that have been discussed to figure out the strategic differences of relative clause constructions cross-linguistically are: the position of the relative clause in respect to the head noun, the adjacency of the relative clause to the head noun, the form of relative pronouns, the presence or absence of a resumptive pronoun in the relative clauses, and noun phrases that can be relativized forming an hierarchy of accessibility (Cook, 1993; Braidi, 1999). The features which are associated with the position of the relative clause and the head noun are explained in Section 2.3, and the relative clause markers and strategies in Section 2.4 of the current chapter. The Accessibility Hierarchy (AH) of noun phrases which can be relativized and shortcomings of previous studies regarding the hierarchy will be discussed in Chapter 3.

Within the framework of basic word-order typology developed by Greenberg (1966), it has been identified that languages with SOV and SVO word order exhibit an opposite array of properties that can be used to characterize a relative clause construction. Korean has SOV word order, unlike English SVO word order, and, partly due to this typological difference in basic word order, some notable features emerge which distinguish Korean relative clauses from those of English. Some of the features in which Korean and English relative clauses typologically differ will be

characterized in the following sections of this chapter. In making this comparison, cross-linguistic references to other languages, mainly SOV or SVO languages, will be added in terms of typological similarities and differences of the relative clauses.

Before reformulating the typological properties of Korean, as an example of an SOV language, in comparison with English, as an example of an SVO language, the definition of the relative clause construction and its general semantic characteristics, which render such definition plausible based on language typology, are provided in the next section.

2.2 Relative clause construction

The relative clause construction primarily consists of a relative clause and its head noun. The relative clause is an embedded clause that modifies the noun (often called the 'head') by restricting its reference. It contains a missing constituent which is coindexed with the head. The missing constituent is syntactically indicated by a 'gap' or an empty category and often called the 'relativized noun'. According to Andrews (1985: 4), a relative clause is a subordinate clause that modifies a constituent external to it by virtue of containing a constituent that is in some sense semantically equivalent to the modified constituent. The subordinate clause is called the relative clause and the modified constituent the head noun. The attributive relation between the relative clause and its head is such that the head is coreferential to some element(s) of the matrix sentence which can be taken independently.

Regarding semantic functions of relative clauses, Downing (1978: 379) provides three general features that can be used to characterize relative clauses cross-linguistically. First, a relative clause never stands alone as a complete sentence. It is

always linked, semantically at least, to a noun phrase that is a part of another clause. Second, a relative clause must be a statement about the relativized noun phrase and thus about its head noun. Third, a relative clause has the functional property of modification such as adjectival or restrictive as opposed to non-restrictive or appositive relative clauses.

Although relative clauses share such semantic features, they show considerably different syntactic manifestations across languages: a relative clause (RC) can modify either a noun phrase (NP) constituent of the matrix sentence which precedes it, or of the matrix sentence which follows it. As to the position occupied by the RC in relation to the head noun, one typological rule that universally applies to syntax is that in some languages (in which the position of the relative clause construction is determined by the OV construction), the RC is usually placed before the head noun, while in other languages (in which the position of the relative construction is determined by the VO construction) it is placed after the head noun. Thus, OV languages such as Turkish, Japanese and Korean have the head-final relative clause construction, while VO languages such as Arabic, Italian, and English have the head-initial relative clause construction. More details about the typological features associated with the position of the relative clause and the head noun are explained in the next section.

2.3 Prenominal position of relative clauses

2.3.1 Externally headed relative clauses

As briefly introduced in the previous section, the most distinguished typological

feature of relative clauses is the position of the head noun in relation to the relative clause. Languages with head-initial relative clauses have the head noun appearing before the relative clause. Languages with head-final relative clauses have the head noun following the relative clause.

Korean is an SOV language with relatively free word order. Relative clauses in Korean precede the head noun, while in English they follow it. Thus, the former are prenominal and the latter are postnominal (Lee, 1967; Tagashira, 1972; Yi, 1983). The head noun is often referred to as the *filler*, and the empty nominal within the RC as the *gap*. In head-initial languages, the filler precedes the gap, while in head-final languages, the gap precedes the filler. (2.1a) is a typical example of Korean where the relative clause precedes the head noun, reflecting the head-finalness in the language, while (2.1b) is an example of English, a head-initial language, where the relative clause follows the head noun:

(2.1) a. John-un [maywu coh-un]$_{RC}$ [sensayngnim]$_{headN}$-ita.

Top very good-Rel teacher-Dec

'John is a teacher who is very nice.'

b. John is a [teacher]$_{headN}$ [who is very nice]$_{RC}$.

In (2.1a), the relative clause [maewu coh-un] precedes its antecedent *sensayngnim*, while in (2.1b), the relative clause [who is very nice] follows its antecedent *a teacher.* The difference between post- vs. pre-nominal in relative clauses is typically well-observed in the major word-order types of languages. Postnominal relative clauses are the overwhelmingly dominant or the most productive form of relative clauses in SVO languages such as English, whereas prenominal relative clauses are the only or

the most productive form in SOV languages such as Korean. German and Finnish belong to the former category, while Japanese and Tibetan to the latter (Downing, 1978; Keenan, 1985). In this respect, Kuno (1974) insists that postnominal relative clauses are characteristics of SVO languages and prenominal relative clauses of SOV languages.

Both prenominal and postnominal relative clauses are examples of externally headed relative clauses, i.e. those in which the head noun occurs outside the relative clause, whether before or after. The other case, namely an internally headed relative clause, is rare and does not have the syntactic structure in (2.1a) and (2.1b). Internally headed relative clauses have their head noun inside the relative clause and no extraction of the head noun occurs; a brief explanation on internally headed relative clauses with reference to Korean will be given in the next section.

2.3.2 Internally headed relative clauses

Internally headed relative clauses are quite rare. Few languages (e.g. Korean, Japanese, Tibetan, Quechua, Navajo, Austronesian, etc.) have internally headed relative clauses, in which the head noun appears inside the modifying clause (Keenan, 1985; Aldridge, 2004; Hiraiwa, 2009). However, in these languages, RCs are usually not exclusively head-internal; they co-exist with head-initial and/or head-final RCs.

In Korean, the internally headed relative clause is marked by an adnominal verbal suffix and *kes* at its right boundary. *Kes*, which can be translated as "a thing," is traditionally described as a bound noun and has minimal semantic content. The positions that can be relativized by the head-internal RC are more restricted than the

head-external RC: only the subject and the object can be relativized. Because there is no gap in the modifying clause and there is no marked lexical head, the relativized element can only be identified through the subcategorization or selectional features of the matrix verb (Jo, 2002).

For example, the sentences in (2.2) and (2.3) both have structurally identical clausal objects. In (2.2), because the verb "return" requires an entity as its object, the object clause gets interpreted as a head-internal RC that means "the book he borrowed." It is thus the object of the embedded clause *chayk* that serves as the semantic argument of the main predicate.

(2.2) John-un [NP [chayk-(ul) pilli-n] kes]-ul pannapha-yess-ta.
Top book-Acc borrow-Rel.Past thing-Comp-Acc return-Past-Dec.
'John returned the book he borrowed.'
(Literally, 'John returned the thing that he borrowed the book.')

On the other hand, in (2.3) the matrix verb "forget" requires a proposition as its object; thus, the object clause is interpreted as a nominal clause that means "that he borrowed the book."

(2.3) John-un [NP [chayk-(ul) pilli-n] kes]-ul ic-e peli-ess-ta.
Top book-Acc borrow-Rel.Past thing-Comp-Acc forget-Aux-Past-Dec.
'John forgot that he borrowed the book.'
(Literally, 'John forgot the thing that he borrowed the book.')

Kes in the RC in (2.2) has traditionally been considered a bound noun, whereas *kes*

in the nominalizing function in (2.3) is considered a complementizer. This distinction is challenged and the independent syntactic status of head-internal RCs is debated by new proposals that *kes* in the head-internal RC should also be considered a complementizer (Jhang, 1994; K. Lee, 1991) or a pronoun (M. Kim, 2006).

Since the salient issues of the study will lie within typological universals of relative clauses and the internally headed relative clause construction is beyond the scope of the research, it will not be discussed further and the focus will be restricted to externally headed relative clauses, such as head-initial and head-final RCs.

2.3.3 Left-branching construction of nominal modifiers

With respect to language typology, it has been proved that Korean belongs to the left-branching language group in the formation of the relative clause along with Chinese and Japanese. Word-order typology (Greenberg, 1966; Comrie, 1981; J. Hawkins, 1983; Keenan, 1985) predicts that SOV languages are predominantly head-final within the noun phrase whereby adjectives, genitives and relative clauses all precede the head noun. This is particularly true in Korean as all nominal modifiers, phrases, and clauses precede the head as predicted by the general tendency of structural characteristics (Comrie, 1981: 90; J. Hawkins, 1988).

The basic order of modifier and head construction in Korean can be demonstrated further by comparing the construction of subordinate clauses in Korean, as head-final, and English, as head-initial. The subordinate clause is a major typological parameter for cross-linguistic comparison (Comrie, 1981). There are two major subordinate clause types in Korean: the relative clause and the noun complement clause, both positioned to the left of the main clauses as in (2.4a) and (2.4b). The subordinate

clauses in bold letters highlight a contrast between Korean and English in regard to branching direction:

(2.4) a. **kokwuk-ey tolaka-nun** oykwuk haksayngtul-un visa-ka epsta.
home country-to go–Rel foreign students-Top visa-Nom don't have
'The overseas students **who are going back to their home country** don't have a visa.' (Relative clause)

b. **kokwuk-ey tolaka-nun** sasil-i kipputa.
home country-to go–Comp fact-Nom pleased
'(I) am pleased about the fact **that (I) am going back to (my) home country**.' (Noun complement clause)

This particular characteristic of the language has been explained by the correlation between SOV word order with prenonimal relative clause, and SVO word order with postnominal relative clauses, which we have discussed in Chapter 2.3.1. In order to process the main clause, it is easier to process the relative clause, which is the subordinate clause in this case, when it occurs either at the beginning of the sentence (SOV) or at the end of the sentence (SVO) because sentences with lower structural complexity are easier to understand (Comrie, 1981). For this reason, centre embedding is difficult to process as it interrupts the flow of the main sentence due to its structural complexity (Lin, 1996). The effect of the left-branching construction and head-finalness of Korean relative clauses will be discussed further with regard to information processing and discourse flow in the next section.

2.3.4 Effects of head-finalness on information flow in discourse

In discourse, information usually flows discourse-chronologically from an earlier point, which is regarded as old, to a more recent point, which is rather new (Fox & Thompson, 1990). It is generally observed cross-linguistically that information shared by the interlocutors comes first, and unshared information appears last in a given discourse unit, which may be referred to as principle of 'Flow of Information from Old to New', following Kuno (1978: 291).

The basic functions of relative clauses are the same in both English and Korean. In both cases, they provide background information about the head noun by modifying or restricting it. However, as the relative clause precedes the head noun in Korean, information about the head noun is presented before the identification of the head noun, and thus affects the flow of information in discourse (Hwang, 1998). For example, if the following sentence (2.5) is translated into Korean using relative clauses in the same sequence, the order of events as presented in the sentence is completely reversed to (2.5c), (2.5.b), (2.5.a) because of the left-branching construction and head-final constraints of Korean relative clauses (examples adopted from Hwang, 1998: 193).

(2.5) a. Slowly he walked along the aisle and up the steps to the choir,

b. here he handed the plate to the priest,

c. who blessed the gifts and then reverently placed them on the alter.

Consequently, the Principle of Information Flow is assumed to work differently in relative clauses in Korean and in English. The reversed information flow of relative

clauses with regard to the position of head nouns can affect processing of relative clause constructions, which occurs naturally in both comprehension and production activities, in first and second language(s) (Clahsen, 1988b, Frazier and De Villiers, 1990; Pienemann, 1998; Van Patten, 1996).

It has been claimed that the order of the verb-object position in a sentence is the cause of constraints in the placement of various grammatical features within a sentence (Greenberg, 1963; Vennemann, 1975). Thus, the position of the relative clause construction is also constrained by the order of verb-object in a sentence (Shin, 2003). Slobin (1971) explains this word-order phenomenon by proposing a psycholinguistic constraint on grammatical form as follows:

> The linguistic universal of modifier placement seems to exist in order to facilitate sentence processing: interposing too much material between the verb and object would place a burden on short-term memory (Slobin, 1971: 69).

The relation between structural complexity and language processing will be discussed further with regard to the filler-gap dependency (i.e. the Structural Distance Hypothesis and the Linear Distance Hypothesis) in Section 3.4.6. I will argue the advantage of linear distance over structural distance in processing Korean RCs in Section 4.5.2 based on the results from the first experiment, the Listening Comprehension Tasks. In the next section, other nominal modifiers which possibly posit between the relative clause and the head noun in Korean, such as determiners and adjectives, will be explained with details.

2.3.5 Adjacency to the head noun

The relative clause in English must be adjacent to the head noun. No constituents can be inserted between the head noun and the relative clause as we can observe from the example (2.6) (adopted from Braidi, 1999: 89, 4.15a):

(2.6) a. [The bread]$_{headN}$ [that John baked]$_{RC}$ was good.

b. *[The bread]$_{headN}$ was good [that John baked]$_{RC}$.

Korean is the same, as shown in the equivalent example (2.7). The relative clause [*John-i kwuwu-n*] must be adjacent to the head noun, [*ppang*] 'bread':

(2.7) [John-i kwuwu-n]$_{RC}$ [ppang]$_{headN}$-i coh-ass-ta.

Nom bake-Rel bread-Nom good-Past-End

'The bread that John baked was good.'

However, in Korean, other nominal modifiers can be inserted between the relative clause and the head noun as in (2.8). The equivalent English sentence, however, would be ungrammatical (example adopted from Shin, 2003: 19, 2.9):

(2.8) **Relative clause + numerical + adjective + adjective + appositive + Noun**

[hocwu-eyse mana-n] + han + yeyppuko + chincelha-n + kyopo + haksayng

Australia-in meet-Rel + a + pretty + kind + overseas Korean

+ student

*‘A student pretty and kind overseas Korean whom I met in Australia’

for ‘A pretty and kind overseas Korean student whom I met in Australia’

Korean can also include an adverbial clause such as [*kathun tongney-ey sal-ki ttaymwuney selo chinha-n*], ‘because we live in the same suburb’ in the relative clause as in (2.9), which is ungrammatical in English (Suh, 1994: 1187, 6):

(2.9) [wuli-nun kathun tongney-ey sal-ki ttaymwuney selo chinha-n] iwustul-ita

We-Top same suburb-in live-Nom because each other close-Rel neighbours-is

*‘We are because we live in the neighbourhood close neighbours.’

for ‘We are close neighbours as we live in the neighbourhood.’

In Korean, when the relative clause is joined with other nominal modifiers, such as determiners and adjectives, the relative clause is usually positioned first. In case that a nominal clause is expanded long, it all precedes the head noun as in (2.8). In left-branching languages like Korean and Japanese, a long constituent, such as a relative clause, precedes a short constituent whereas in right-branching languages like English, short precedes long. This is due to the need for the right peripheral recognition of the long constituent as well as the efficiency of processing in terms of parsing relative clauses (J. Hawkins, 1994).

As demonstrated, the adjacency of the relative clause to its head noun is consistent with the left-branching, prenominal, and head-final characteristics of relative clause construction in Korean. The long recursive, left-branching relative clause will delay the identification of the head noun in the construction of the relative clause in

Korean. However, the relativizer in Korean as a clause ender provides vital parsing cues that enable the parser to recognize and parse the relative clause in the sentence structure. The form and function of the relativizers will be explored in the next section.

2.4 Relative clause markers

2.4.1 The forms of relativizers

Another typological aspect we need to consider regarding relative clauses is the existence and the form of a relative-clause marker (i.e. a relativizer). A relative-clause marker marks a certain part of a sentence as a relative clause as shown in the following example (2.10):

(2.10) [The man [that I met]$_{S'}$]$_{NP}$

The example illustrates the three basic parts of relative clause construction: the head noun (*man*), the modifying clause (*I met*), and the relativizer (*that*) which links the modifying clause to the head. A relativizer is basically a special type of complementizer which marks the modifying clause in a relative clause construction. In languages with head initial relative clauses, the relativizer, sometimes in the form of a relative pronoun, follows the head noun immediately and precedes the relative clause. The relative pronoun can be case-marked, therefore specifying the kind of extraction in the upcoming clause. In languages with head-final relative clauses, a relativizer does not always exist, and is usually not case-marked.

A relative pronoun can be defined cross-linguistically as an anaphoric element which introduces the modifying clause and takes the head noun as its antecedent. The crucial difference of a relative pronoun and a relativizer is that a relative pronoun is a special type of pronoun, i.e. an anaphoric NP, while a relativizer is not. The distinct evidence for the anaphoric nature of the relative pronoun is agreement. In other words, the form of the relative pronoun changes depending on some features of the head noun, such as gender, number, animacy, etc. Moreover, a relative pronoun is often inflected for case, which is a property of NPs. A relativizer, in contrast, is normally an invariant particle (one that does not change shape), much like a complementizer. If there are changes in the shape of the relativizer, they are usually morpho-phonemic in nature and do not reflect agreement or case features (Kroeger, 2005).

In Korean, there is no overt relative pronoun between the relative clause and its head noun while English allows a relative pronoun. Korean does not employ *wh*-words corresponding to English relative pronouns such as *who*, *whose*, *whom*, *which*, and *that*. In (2.1b) in Section 2.3.1, the English relative clause [who is very nice] is initiated by the relative pronoun *who*, while the relative clause [maywu coh-un] in (2.1a) is neither preceded nor followed by any form that might be called a relative pronoun. Instead, relative clauses in Korean are connected to their head nouns by means of the relativizer suffix (Rel) *–(u)n*. This suffix functions as an adnominal marker and indicates that the previous clause is an embedded relative clause.[6] The particular significance of the relativizer in Korean is its additional semantic and grammatical roles of marking the tense: *-(u)n* for past tense, *-(u)l* for future, *-nun* for

[6] Korean adjective phrases in prenominal position also take adnominal markers as follows:
e.g. Olaytoy-n cip
old-Adn house
'The old house'

present, and *–koissnun* for present progressive.

(2.11) John-i sa-n cip-un maywu khu-ta.
Nom buy-Past Rel house-Top very big-Dec
'The house John bought is very big.'

(2.12) John-i sa-l cip-un maywu khu-ta.
Nom buy-Future Rel house-Top very big-Dec
'The house John will buy is very big.'

(2.13) John-i sa-nun cip-un maywu khu-ta.
Nom buy-Present Rel house-Top very big-Dec
'The house John buys is very big.'

(2.14) John-i sa-koissnun cip-un maywu khu-ta.
Nom buy-Present Progressive Rel house-Top very big-Dec
'The house John is buying is very big.'

The relative complementizers in sentence (2.11) to (2.14) are absent in English. These relative complementizers are used not only to show where relativization has occurred, but also to signal the tense of the relative clause (Yang, 1972; T. Kim, 1974). These morphemes are, however, regarded as tense markers rather than relative clause markers because they do appear in other types of sentences as well (Tagashira, 1972; T. Kim, 1974). The addition of a final suffix attached to the verb is also found among other SOV languages whose RC's are prenominal with verb-final word order,

such as Navajo (Platero, 1974), Basque (De Rijk, 1972), Classical Japanese (Downing, 1978), and Turkish (Downing, 1978; Comrie, 1981).

2.4.2 Relativization strategies

Three basic strategies which languages commonly use to indicate the relativized function, the function of the head noun in relation to the modifying clause, within a relative clause are: the gap strategy, the relative pronoun strategy, and the pronoun retention strategy (see Kroeger, 2004).[7] The gap strategy, as the name implies, involves a filler-gap relation and signals the identity of the relativized function through the clue of the "gap" or missing argument in the modifying clause. The head noun here is interpreted as filling this gap. What is significant with the gap strategy is not merely the presence of a gap. For instance, an English relative clause contains a gap whether or not a relative pronoun is used. The crucial point is that, when the relative pronoun is present, it provides at least some information about the relativized function. On the other hand, when there is no relative pronoun, the gap itself is the hearer's only clue. Accordingly, gap and relative pronouns are two different strategies which languages may use to accomplish the same goal, namely to identify the relativized function. As for the relative pronoun strategy, the function and forms of relative pronouns are discussed in the Section 2.4.1 with reference to the specific features of relativizers in Korean. The third commonly used strategy is pronoun retention, in which the relativized function is assigned to a pronominal "copy" of the head noun, i.e., a resumptive pronoun. These resumptive pronouns are

[7] Relativizers may occur with either the gap or the pronoun retention strategies. The use of a relativizer is not a distinct strategy, since the relativizer itself provides no information about the relativized function.

regular personal pronouns which occur inside the modifying clause and agree with the head noun in gender and number.

Investigations of which languages use which strategy have revealed some interesting correlations between relativization strategy and word order. The gap strategy is found to be efficient in all types of languages, and is virtually the only strategy used in prenominal relative clauses. Relative pronouns have (so far) been found only in postnominal relative clauses and pronoun retention is also found almost exclusively in postnominal relative clauses.[8] In Korean, a pronoun is retained only when genitive is relativized (see Section 3.2.1) and therefore, in terms of relativization strategies, the lack of relative pronouns is the most salient feature differentiating the relative clauses in Korean from those in a language like English.

2.4.3 Issues under discussion regarding Korean relativization

In the framework of transformational grammar, relative clauses in Korean have received much attention as there has been some disagreement in Korean linguists' accounts of the formation of relative clauses in Korean. In the classical generative transformational framework, Korean relativization was often analyzed in terms of coreference between the target and the head noun, with the target undergoing deletion along with its case marker in the embedded sentence. One primary function of Korean relativization is thus to delete a noun which is coreferential with that of a matrix sentence as changed from (2.15a) to (2.15b) below:

[8] Keenan (1985: 149) cites Chinese as the only known counter-example to this generalization.

(2.15) a. John-i cip-ul sa-(a)ss-ta. Ku cip-un maywu khu-ta.

Nom house-Acc buy-Past-Dec the house-Top very big-Dec

'John bought a house. The house is very big.'

b. John-i sa-n cip-un maywu khu-ta.

Nom buy-Past Rel house-Top very big-Dec

'The house John bought is very big.'

Another process involved in Korean relativization is a shift of the verb ending *–ta* of the embedded sentence to a relative complementizer so as to signal that relativization occurs at the boundary. Within the transformational framework, the formation of Korean relative clauses accordingly does not call for any movement at all. There are two reasons put forward for the adoption of the deletion hypothesis: firstly, relativization in Korean, along with Japanese, does not seem to be subject to island constraints, which were posited by Ross (1967) and have been considered as constraints on movement rules. Some relative clauses in Korean are well-formed in spite of the fact that they apparently violate the classical island constraints (Kuno, 1973; Saito, 1985)[9]; secondly, no overt evidence of movement (such as the presence of a relative pronoun which is observed in postnominal relative clauses) is found in Korean.

However, Korean relative clauses exhibit all the typical properties of Wh-movement proposed in Chomsky (1977: 86) except that they do not have an overt relative pronoun. In this respect, linguists working within the framework of the

[9] See Kuno (1973: 234-242) for the crucial data against the movement analysis of relativization in Japanese. Covering all the counter examples as evidence against the movement analysis of Korean relativization is out of the scope of this thesis.

Government Binding theory (Chomsky, 1981) have treated Korean relativization as involving movement (Kang, 1986; Han, 1992; Kaplan & Whitman, 1995; Hong, 1996). They treat relativization as involving *wh*-movement, as postulated for English relative-clause formation. In Government-Binding (GB) accounts, Korean relative clauses have been considered parallel to the English *that*-less relative clauses, of the kind shown in (2.10a)'. The English *that*-less relative clause of the example (2.10) in Section 2.4.1 has the structural analysis shown in (2.10b)':

(2.10)' a. the man I met

b. the man [Op_i [I met t_i]]

c. the man [$whom_i$ [I met t_i]]

The empty category "Op" in (2.10b)' is known as an "empty operator". (2.10b)' is essentially identical to (2.10c)', which differs only in that the moved element is the overt relative pronoun *whom*. In (2.10c)', the coreferential NP is pronominalized with that of the matrix sentence as a relative pronoun *whom*, which is generated as the object of *met*, and is then moved to the initial position of the relative clause, leaving behind a "trace" of movement. Under this analysis, the structure of (2.10b)', which is given the same derivation as (2.10c)', is shown in more detail in Figure 2.1 as follows:

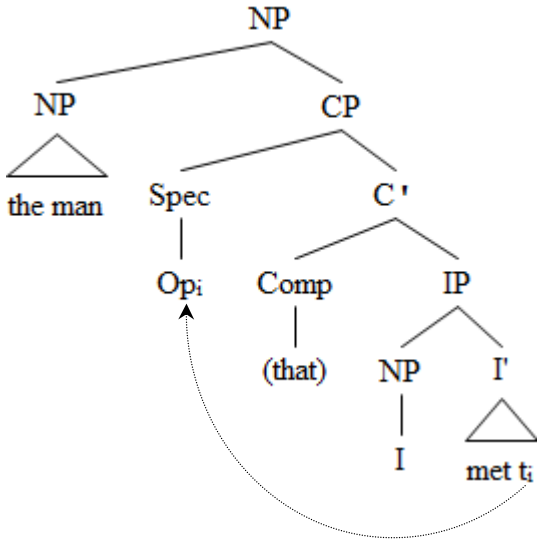


Figure 2.1. The trace of movement in (2.10b)'

As shown in Figure 2.1, the empty operator moves to the Specifier position of CP, a phrase projected from the Comp (complementizer, C for short). In English, this position may be filled by the complementizer *that* as in (2.10) in Section 2.4.1, or left empty as in (2.10a)'. Below this, the sentence is assigned the category of IP, rather than the traditional S, to treat tense as an independent category. IP is a domain whose head is called INFL, for "inflection" (I for short)[10].

The syntactic movement analysis of Korean relativization is motivated by the fact that Korean relative clauses exhibit all the typical properties of the *wh*-movement postulated for English relativization, except that they do not have an overt *wh*-pronoun. The structural analysis of the Korean example which corresponds to (2.10) should roughly be as indicated in (2.16), with movement going to in the other direction to reflect the "prenominal" and "head-final" properties of relative clauses in Korean:

[10] See Matsumoto (1997: 14) for more details.

(2.16) [[nay-ka t_i manna-n] Op_i] namca

I-Nom met-Rel man

'the man I met'

Given the fact that Korean relative clauses show all the characteristics of *wh*-movement except the presence of an overt relative pronoun, they have been considered parallel to the English *that*-less relative clauses with respect to Government-Binding (GB) accounts as shown below in Figure 2.2:

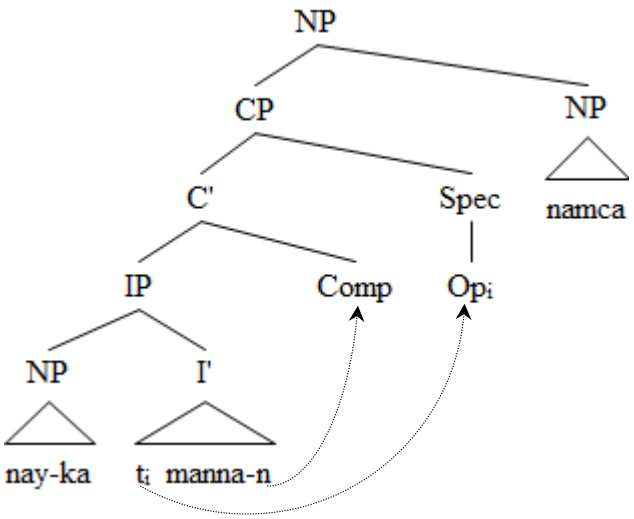


Figure 2.2. The trace of movement in (2.16)

It has thus been assumed that Korean relative clauses contain a base-generated empty relative operator which undergoes *wh*-movement to the Specifier position of CP as in English. Upon the analysis above, a series of affixal elements, such as *–n* in (2.16), are to be analyzed as affixal complementizers. As *–n* must follow all aspect, tense, and mood affixes and immediately precede the relative head, it is thus in the predicted position of a relative clause complementizer in a head-final language like Korean (Yoon, 1990: 176; Han, 1992: 336; Kaplan & Whitman, 1995: 30). Such

analysis assumes that Korean relative clauses are underlyingly identical to English: they consist of a CP selecting a tensed clause. Korean and English differ on the surface only in that in Korean the relative complementizer is affixal, requiring the verb to raise to C (V-to-Comp) in order to support the affixal complementizer of left-branching relative clauses in Korean as appeared in Figure 2.2.

However, a particular important proposal with regard to relative clauses in East Asian languages, such as Japanese, Chinese and Korean, has been developed by Murasugi (1991) and Matsumoto (1997). Murasugi (1991) argues that, while in certain relative clauses in Japanese there may be an empty category corresponding to the "position that is relativized", it is actually quite hard to show that such an empty category is a trace of movement, rather than a zero pronoun (which is called "*pro*" in the Government Binding (GB) theory), directly related to the head noun. Following the discussion in Murasugi (1991) with regard to the structural analysis of Japanese relative clauses, Matsumoto (1997: 16) proposes another possible structure in which there is no Op and the head noun is directly coreferential with the clause-internal *pro* as there is no movement internal to the relative clause. Given the great deal of structural similarities between Japanese and Korean relative clauses, Matsumoto's structural analysis on Japanese relative clauses can be transformed into Korean and projected in Figure 2.3 as follows:

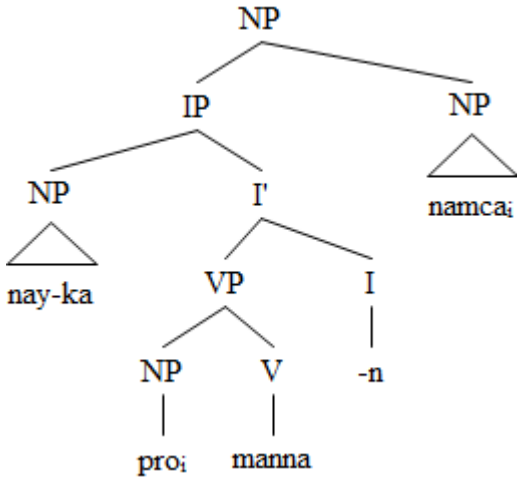


Figure 2.3. The possible structural analysis of (2.16) with reference to Matsumoto (1997)

As shown in the Figure 2.3 with reference to Matsumoto's (1997) argument, Korean relative constructions can be also interpreted that the over relative operator is absent and it is, therefore, not clear whether the movement of the empty operator to Specifier position of CP actually occurs. Moreover, a complementizer indicating the structural boundary between the head NP and a relative clause is less obvious than its English counterpart. In addition, it is still controversial whether the morpheme *–n* attached to the verb *manna* in (2.16) expresses tense or aspect (Choe, 1988; Lee, 1991). Under the current structural analysis based on Matsumoto's (1997) argument, the adnominal markers, such as *nun* for the present tense, are taken as INFL (adnominal verbal tense inflection), rather than Comp, and regarded as tense markers along with *(u)n*, *tun*, and *esstun* for the past tense, and *(u)l* for the future. The basic idea here is that the linguistic theory of embedding must accommodate both Comp and INFL heads in underlying structure.

2.5 Summary

In this chapter, some typological characteristics of relative clauses in Korean (mainly prenominal, head-final, and left-branching features) have been investigated. Although the typological characteristics of relative clauses in Korean, an SOV language, have been generally identified from cross-linguistic comparisons to SVO languages such as English, the discussion on the existence of movement in Korean relative clauses has not been converged and is still controversial.

The most peculiar property of Korean relativization presented from the work in this chapter is that the structural analysis of Korean relative clauses involving movement can be also generated without movement. Thus, generally, if there is some kind of empty element in relative clauses, the strategies for identifying it cannot be constrained by the properties of the movement relation. As Matsumoto (1997) suggests, the identification of movement is one of the strategies which should not be given a privileged status if there are some broader construal processes.

With regard to the Matsumoto's work, a particularly important proposal in linguistic typology is recently developed by Comrie. Comrie (2002) argues that the relativizability in East Asian languages (e.g. Japanese, Chinese and Korean) is constrained not by grammatical relations but by semantic and pragmatic factors, and the relative clauses in these languages thus do not follow the same typological or acquisitional generalizations as those for European languages. In this respect, two implicational hypotheses in typological universals of relative clauses, the Noun Phrase Accessibility Hierarchy (NPAH) and the Markedness Differential Hypothesis (MDH), will be explored in Chapter 3. This will be followed by discussion on the controversy surrounding these hypotheses, which have been revealed in previous studies in the fields of language typology and second language acquisition.

CHAPTER 3

Typological universals of relative clauses

3.1 Introduction

This chapter deals with two typological universals of relative clauses, the Noun Phrase Accessibility Hierarchy (NPAH) hypothesis (Keenan & Comrie, 1977) and the Markedness Differential Hypothesis (MDH) (Eckman, 1977, 1985a), and reviews previous first and second language research on the two hypotheses together with some of their controversial issues.

Typological universals have been examined for a wide range of grammatical structures and categories such as adverbial clauses, animacy, case marking, complementation, grammatical relations, negation, passive voice, relative clauses, transitivity and word order. However, the role of typological universals in second language acquisition has been controversial and only a few typological universals have been addressed in second language research. A good example of how enquiry in the field of typological linguistics can shed light on the second language research can be found in the study of relative clauses. Research into relative clauses with typological perspectives has primarily centred on the Noun Phrase Accessibility Hierarchy (NPAH) hypothesis (Keenan & Comrie, 1977) and the Markedness Differential Hypothesis (MDH) (Eckman, 1977, 1985a). These two implicational hypotheses will be explained in the Section 3.2.1 and Section 3.2.2 respectively

before moving on to discuss, in Section 3.3.1, the shortcomings of arguments for these hypotheses based on Comries' new typology of noun-modifying clauses in East Asian languages.

3.2 Implicational hypotheses in typological universals of relative clauses

3.2.1 The Noun Phrase Accessibility Hierarchy (NPAH) hypothesis

The Noun Phrase Accessibility Hierarchy (NPAH) is an implicational hypothesis proposed by Keenan and Comrie (1977) that delineates a cross-linguistic hierarchical consistency regarding the grammatical functions of noun phrases that are accessible to relativization in relative clauses: if a language can relativize a given NP, then any other NP in a higher position in the hierarchy can also be relativized. Subjects are highest in the hierarchy, followed by direct objects, indirect objects, obliques (objects of a preposition), genitives, and objects of comparison. English, for instance, allows nouns in all of the functions of noun phrases on the hierarchy to be relativized. The examples below illustrate each of the possible grammatical functions of the nouns that can be relativized in English (examples adopted from Gass, 1979).

(a) Subject (SUB)

The dog that bit the man…

(b) Direct object (DO)

The man that the dog bit…

(c) Indirect object (IO)

The girl that I wrote a letter to…

(d) Object of a preposition (OBL)

The house that I talked to you about…

(e) Genitive (GEN)

The family whose house I like…

(f) Object of comparative (OCOMP)

The woman that I am taller than…

On the basis of data from about fifty languages, Keenan and Comrie (1977) argued that all languages seem to allow relativization on the subject and that the accessibility of other functions to relativization differs cross-linguistically. However, Keenan and Comrie (1977) demonstrated that this variation is not random, proposing a hierarchy explaining the accessibility of different constituents to relativization. They proposed that the relativizability of certain positions is dependent on that of others and these dependencies are typologically universal. Cross-linguistically, languages allow different noun functions to be relativized, forming an implicational hierarchy and this Accessibility Hierarchy (AH) is formulated as follows (Keenan & Comrie, 1977: 66):

Subject (SU) > Direct Object (DO) > Indirect Object (IO) > Oblique Object (OBL) > Genitive (GEN) > Object of Comparison (OCOMP)[11]

Subjects represent the most unmarked accessible function. The AH states that, if a language allows relativization on any of the functions lower on the hierarchy – that is, on the more marked end of the hierarchy – the less marked functions will also be

[11] The symbol > here denotes 'is more accessible than'.

accessible in that language. In other words, if a language can relativize a certain position on the hierarchy, it can also relativize any position to the left but not necessarily to the right. For example, if a language allows relativization of indirect objects, it will also allow relativization of direct objects and subjects. The reverse, however, is not true. If a language allows relativization of indirect objects, it will not necessarily allow relativization of noun functions on the more marked end of the hierarchy.

To specify the AH, Keenan and Comrie (1977: 67) offered the Hierarchy Constraints (HCs) as follows:

The Hierarchy Constraints (HCs)

1. A language must be able to relativize subjects.
2. Any RC-forming strategy must apply to a continuous segment of the AH.
3. Strategies that apply at one point of the AH may in principle cease to apply at any lower point.

Keenan and Comrie explained that the HCs define conditions that any grammar of a human language must meet. HC_1 says that the grammar must be designed to allow relativization on subjects, the uppermost end of the AH. Thus, for example, no language can relativize only DOs, or only locatives. It is possible, however, for a language to allow relativization only on subjects and this possibility is in fact realized: In a language such as Malagasy, for example, which only allows relativization on the subject, the direct object and indirect object can be relativized by promoting them to surface subject through use of the passive voice and the so called circumstantial voice (Comrie, 1981).

HC_2 states that, as far as relativization is concerned, a language is free to treat adjacent positions on the AH as the same, but it cannot "skip" positions. Thus, if a given strategy can apply to both subjects and locatives, it can also apply to DOs and IOs. And HC_3 states that each point of the AH is a possible cut-off point for any strategy that applies to a higher point. This means that, in designing the grammar for a possible human language, once we have given it a strategy that applied at some point on the AH, we are free to terminate its application at any lower point (Keenan & Comrie, 1977).

As for Korean, relative clauses can be formed on the first four slots in the hierarchy as shown in the following examples:

Simplex sentence:

John-i wucheykwuk-eyse Mary-eykey phyenci-lul ponay-ss-ta.
Nom post office-Loc Dat letter-Acc send-Past-Dec
'John sent a letter to Mary at the post office.'

(3.1) Subject RC:

[wucheykwuk-eyse Mary-eykey phyenci-lul ponay-n] salam
post office-Loc Dat letter-Acc send-Rel person
'The person (which indicates John here) who sent Mary a letter at the post office.'

(3.2) Direct Object RC:

[John-i wucheykwuk-eyse Mary-eykey ponay-n] phyenci
Nom post office-Loc Dat send-Rel letter
'The letter which John sent to Mary at the post office.'

(3.3) Indirect Object RC:

[John-i wucheykwuk-eyse phyenci-lul ponay-n] salam

Nom post office-Loc letter-Acc send-Rel person

'The person (which indicates Mary here), to whom John sent a letter at the post office.'

(3.4) Oblique Object RC:

[John-i Mary-eykey phyenci-lul ponay-n] wucheykwuk

Nom Dat letter-Acc send-Rel post office

'The post office at which John sent Mary a letter.'

As for the fifth slot in the hierarchy, Keenan & Comrie's data illustrates that genitives can only be relativized in Korean when the resumptive pronoun *caki* is retained, as in (3.5) (Keenan & Comrie, 1977: 74):

(3.5) caki-uy kay-ka chongmyengha-n ku salam

Pro-Poss dog-Nom smart-REL the man

'The man whose dog is smart.'

The resumptive pronoun is used to indicate that the reference is already known. Accordingly, the constraint at work in genitive RC's would be such that the clause modifying head noun should be in a conceptually or physically close relationship to the genitive relative clause. That is, they need to be semantically 'inalienable' to each other (Kim, J. B., 1998: 793). The retention of the resumptive pronoun in the sentence makes the relationship between relative clause and head noun semantically transparent and thus makes processing easier (J. Hawkins, 1994: 44).

In English, the resumptive pronoun is absent in the relative clause except in natural speech occasionally (Trarallo and Myhill, 1983). The following sentence (3.6) is ungrammatical because the resumptive pronoun 'her' is left in the relative clause:

(3.6) *The woman [whom you spoke to *her*] just left.

(taken from Braidi, 1999: 89)

In fact, Keenan and Comrie (1977: 93) showed various data of pronoun retention in relative clauses and observed that many languages besides Korean change RC-forming strategies at the genitive position by presenting a pronominal element in the position relativized. However, what we have to notice here before looking at the applicability of the Accessibility Hierarchy to Korean in terms of the primary RC-forming strategy is that the pronoun retention only occurs in Korean when a genitive is relativized, as briefly discussed in Section 2.4.2. In this regard, Keenan and Comrie's (1977: 68) Primary Relativization Constraint (PRC) is worth to noting. Based on the Accessibility Hierarchy (AH), they proposed the three putatively universal conditions on RC-forming strategy as follows:

The Primary Relativization Constraint (PRC)

1. A language must have a primary RC-forming strategy.
2. If a primary strategy in a given language can apply to a lower position on the AH, then it can apply to all higher positions.
3. A primary strategy may cut off at any point on the AH.

Keenan and Comrie defined an RC-forming strategy in a given language to be a

primary strategy (in that language) if it can be used to relativize subjects, which is a gap strategy in Korean. Moreover, according to the PRC, relativizability of a low position on the AH should entail relativizability of all higher positions and the failure of the converse. In this respect, pronoun retention of the genitive relative clauses is beyond the scope of the "primary relativization strategy" in Korean. Therefore, restricting our attention to primary RC-forming strategies, genitive relative clauses with pronoun retention will be excluded from the Accessibility Hierarchy of Korean presented in this and following sections and also from the experimental design of this thesis.

As for the final slot in the hierarchy, the object of comparison cannot be relativized in Korean (Yeon, 2003: 39) as follows:

(3.7) a. John-i Mary-pota khu-ta.
Nom than taller-Dec
'John is taller than Mary.'
b. *[John-i te khu-n] Mary
Nom more tall-Rel
'Mary who John is taller than'

According to the discussion above on the application of the Accessibility Hierarchy to Korean relativization, the patterns of relativization in English and Korean can be finally described as following:

Accessibility positions for relativization:

English: SU > DO > IO > OBL > GEN > OCOMP

Korean: SU > DO > IO > OBL

The Accessibility Hierarchy does not only predict which constituents can be relativized but also implies that the further constituents are to the left, the easier and more frequently they are relativized. Keenan and Comrie (1977: 88) claimed that the lower a position on the AH, the harder it is to process relative clauses formed on that position. Relativizing constituents towards the right of the hierarchy often results in either more marked or unusual structures, such as the genitive relativization with pronoun retention in Korean.

Although the NPAH was originally formed as a typological universal, it was later extended to the order of difficulty in acquiring and processing RCs in terms of markedness of the RC types (Doughty, 1991; Eckman, Bell, & Nelson, 1988; Gass, 1979; J. Hawkins, 2007). In this respect, the concept of difficulty in RC acquisition and processing should be discussed in depth to investigate possible correlations between the degree of difficulty, markedness, and accessibility. For this purpose, another implicational hypothesis of relative clauses, the Markedness Differential Hypothesis, will be introduced in the section 3.2.2 in the frame of typological universals.

3.2.2 Markedness Differential Hypothesis (MDH)

In relating typological universals to second language acquisition (SLA), Eckman (1977, 1985a) proposed a hypothesis of how typological markedness could be

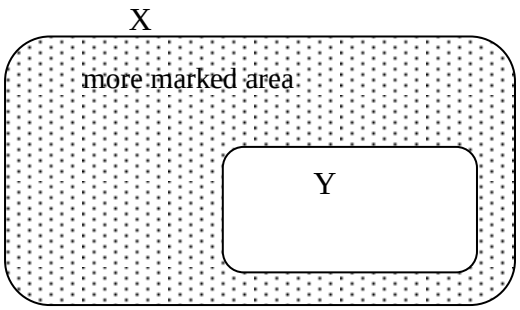
incorporated into a theory of language transfer and contrastive analysis in research on SLA. As with the work in UG universals, this work in typological universals represents an attempt to explain various facts about SLA in terms of an interaction between language transfer and language universals. Eckman's Markedness Differential Hypothesis (MDH) combined both the theoretical background of typological universals and the notion of language transfer in a way that would provide a stronger predictive power. By using a typological analysis of the native language (NL) and of the target language (TL), one could predict the areas of difficulty that a given L2 learner would have, based on the markedness of the structures in the NL and the TL.

These predictions, like those of UG parameters, are made based on more abstract properties of the two languages in question – the structural dependencies that emerge from cross-linguistic analysis – than were those used to predict language learning difficulties in the Contrastive Analysis Hypothesis (CAH). Although the main goal of the MDH, explaining the areas of language learning difficulty, is essentially the same as the goal of the CAH, the notion of difficulty of the MDH is significantly different from that of the CAH. The CAH attempts to explain the difficulties on the basis of differences between the NL and TL, such that difficulty is predicted where there are NL-TL differences, and lack of difficulty is predicted from NL-TL similarities. In testing these predictions against the facts of SLA, proponents of CAH run into some problems. The major problems for the CAH include cases in which difficulty exists but there are not corresponding differences between the NL and TL (Richards, 1971; d'Anglejan & Tucker, 1975) and instances where differences between the NL and TL do not cause problems in learning (Gradman, 1971). To remedy such problems of the CAH, the MDH claims that differences between the NL and TL are not sufficient for

an adequate explanation of the difficulty. In addition to NL-TL differences, it is necessary to assume a measure of *degree of difficulty* whereby it is possible to predict those differences that lead to learning problems. The proposal made by the MDH is that degree of difficulty in SLA corresponds to the notion of typological markedness, as defined below:

> A phenomenon or structure X in some language is relatively more marked than some other phenomenon or structure Y if cross-linguistically the presence of X in a language implies the presence of Y, but the presence of Y does not imply the presence of X (Eckman, 1985a: 290).

For better understanding, the definition above can be diagrammed as following:



Given this definition, the MDH can be stated as follows (Eckman, 1985a: 291):

Markedness Differential Hypothesis

The areas of difficulty that an L2 learner will have can be predicted on the basis of a comparison of the NL and the TL such that:

(a) those areas of the TL that are different from the NL and are relatively more marked than in the NL will be difficult;

(b) the degree of difficulty associated with those aspects of the TL that are

different and more marked than in the NL corresponds to the relative degree of markedness associated with those aspects;

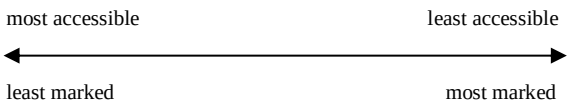
(c) those areas of the TL that are different from the NL but are not relatively more marked than in the NL will not be difficult.

For English and Korean, the predictions of the MDH and AH of relative clauses can be illustrated with regard to the relativization patterns of the two languages and the degree of markedness as follows:

Accessibility positions for relativization:

English: SU > DO > IO > OBL > GEN > OCOMP

Korean: SU > DO > IO > OBL



English allows relativization for all functions on the AH. On the other hand, Korean allows relativization of the functions SU, DO, IO, and OBL. According to the MDH, the English relativization of the functions GEN and OCOMP, which is absent in Korean, is relatively more marked. The prediction is thus that it would be difficult for Korean learners of the English language to learn or process GEN and OCOMP relative clauses in English. For English speakers learning Korean, there will be no difficulty in learning the RC structure in Korean, which is different from but not relatively more marked than the RC structure in English. Therefore, the overall comprehensive order of difficulty in learning and processing Korean RCs will be consistent with the English AH.

This comprehensive hierarchy is, so to speak, an extended version of the NPAH which is backed up by the predictions of the MDH. In this thesis, this extension will be called the NPAH effect (following Comrie, 2007: 304) when clear labelling should be made to distinguish it from the original typological generalization of the NPAH. The NPAH effect refers to the phenomenon that the further constituents are to the left on the AH, the easier they are acquired or processed. This term is sometimes used interchangeably with the term *subject-object asymmetry* and *subject advantage* when the effect is limited to comparing only subject and object RCs and subject RCs seem to be easier to acquire or process than object RCs (Lee, 2011: 58). In this thesis, interesting findings against the subject-object asymmetry will be discussed in Section 4.5 with regard to the effect of animacy on processing subject and object RCs.

As for typological characteristics of RCs regarding the NPAH effect, Eckman (1977) notes that relative-clause formation in different languages includes a number of additional distinct aspects – for example, the choice of relative pronouns or the position of the relative clause in relation to the head noun. Eckman insists that not all of these distinctions are governed by implicational markedness relations. Therefore, these differences can be viewed as neither more nor less marked and should not cause difficulty in processing for L2 learners.

3.2.3 Shortcomings of arguments for the implicational hypotheses in second language acquisition of relative clauses

Apart from the explanation of the correlation of the NPAH and the MDH in the acquisition of RCs, however, there is one major problem regarding the empirical

generalization: the types of language on which these two hypotheses have been tested (Shirai & Ozeki, 2007). The target languages tested to prove the NPAH effect so far have been mainly English and a small number of European languages, such as Italian (Croteau, 1995), French (R. Hawkins, 1989), and Swedish (Hyltenstam, 1984). As such research on the acquisition of European languages has mostly converged to support the NPAH, it might appear that a general consensus has been reached regarding the effect of markedness in the acquisition of RCs in L2.

Whereas the RCs of the European languages are in accordance with the NPAH, it has been controversial whether the acquisition of RCs in East Asian languages, such as Korean, Japanese, and Chinese, follows the hierarchy and this question has recently attracted great attention from language researchers. The number of studies carried out to examine typological universals in East Asian languages is, however, still relatively small and not yet satisfactory compared to similar studies in English and European languages, which apparently reflects the European language bias in SLA studies. Needless to say, typological universals of SLA have to be broadly tested against typologically diverse languages (Jin, 1994; Shirai & Kurono, 1998).

In this respect, a particularly important proposal in linguistic typology is recently developed by Matsumoto and Comrie. With regard to Japanese, Matsumoto (1988, 1997) offered an explanation based on semantic and pragmatic – rather than syntactic – conditions to determine the availability of noun-modifying clauses in Japanese. Based on her work, Comrie (1996, 1998, 2002) proposed a new typology that distinguishes Japanese and other Asian languages with similar properties from European-type languages. He argued that noun-modifying clauses in many Asian languages (e.g. Japanese, Chinese and Korean) are qualitatively different from those in European languages because these Asian languages do not have RCs with a gap

but, rather, have attributive clauses, which involve simply attaching modifying clauses to the head noun. He suggested that such clauses in East Asian languages should be treated as attributive clauses rather than European-type RCs, based on the observation that relativizability is constrained not by grammatical relations but by semantic and pragmatic factors in these languages. Comrie's new typology of noun-modifying clauses will be addressed in detail in Section 3.3.1.

In light of Comrie's new typology of noun-modifying clauses discussed above, recent studies in L1 acquisition have found results consistent with his new proposal. Diessel and Tomasello's (2000) study on children's conversation and Diessel and Tomasello's (2005) solicited imitation studies with English and German children both clearly supported the predictions of the NPAH, showing the order SU > DO > OBL in production frequency (Diessel & Tomasello, 2000) and in accuracy of elicited imitation (Diessel & Tomasello, 2005). In contrast to German children's RC acquisition, Ozeki and Shirai's (2007b) study on Japanese children showed that they produced SU, DO, and OBL relatives at the same frequency. These contrasting results from L1 acquisition studies might indicate that these two target languages are qualitatively different.

In SLA, research on Asian languages so far has shown conflicting results. Tarallo and Myhill's (1983) crosslinguistic study that employed grammaticality judgements followed the NPAH prediction except when the target languages were Japanese and Chinese, which is consistent with Comrie's new proposal. Similarly, Ozeki and Shirai (2007a) demonstrated that the acquisition of Japanese does not necessarily follow the predictions of the NPAH. In their Study 1, DO and OBL relatives develop as early as SU relatives, and, in their Study 2, there was no statistically significant difference between SU and DO relatives in the accuracy of combining sentences

using relative clause constructions. O'Grady et al.'s (2003) study of the comprehension of Korean RCs by L1 English learners of Korean, however, supported the NPAH: SU relatives were easier to comprehend than DO relatives. In contrast, Jeon and Kim (2007) found that in an oral picture description task, externally headed RCs followed the predictions of the NPAH but internally headed RCs did not; they argued that this is because the former involve a gap, whereas the latter do not.[12]

Due to the contrasting results described above, it thus appears that the generalization with regard to the acquisition of East Asian languages as L2s seems to be quite different from the generalization that holds for the acquisition of European languages, which have consistently followed the NPAH. Therefore, we apparently need further testing of the acquisition of RCs (or noun-modifying clauses) in East Asian languages to compare with RCs in European languages and finally come to some understanding of their unique qualitative differences from European-type RCs regarding the NPAH, so far known as a typological universal. In this respect, relevant studies on the acquisition of RCs in East Asian languages, such as Japanese, Chinese, and mainly Korean, will be discussed concretely in the following chapter.

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[12] In Korean, there are two different types of relative clauses: head-external RCs and head-internal RCs (see Section 2.3.1 and 2.3.2 for review). The head-external RCs in Korean consist of a lexical head noun and a modifying clause. In the respect of RC construction, they are similar to RCs found in European languages. In contrast, the head-internal RC is assumed to involve no gap in the modifying clause because the relativized argument or the lexical head remains in the modifying clause. The clause is marked by an adnominal verbal suffix and *kes* at its right boundary. *Kes*, which can be translated as "a thing," is traditionally described as a bound noun and has minimal semantic content as shown in the following example:

e.g. John-un [NP [chayk-(ul) pilli-n] kes]-ul pannapha-yss-ta.
Top book-Acc borrow-Rel.Past thing-Comp-Acc return-Past-Dec.
'John returned the book he borrowed.' (Literally, 'John returned the thing that he borrowed the book.')

If we cast the properties of Korean noun-modifying clauses in Comrie's terms, head-internal RCs fit the characteristics of attributive clauses although Comrie's interpretation would not recognize structural differences between the head-external and the head-internal construction. In this respect, Jeon and Kim (2007) assumed that head-external relative constructions are RCs, whereas head-internal relative constructions in Korean are attributive clauses for their research.

3.3 Cross-linguistic investigations into relative clause acquisition in Korean

The Noun Phrase Accessibility Hierarchy (NPAH), originally proposed by Keenan and Comrie (1977), is basically a hierarchy that concerns the relativizability of a noun phrase (NP) with respect to the grammatical relations between the head noun and the relative clause (RC). Although Keenan and Comrie's original generalization of this hierarchy was not meant to predict acquisition order of RCs, it was hypothesized (e.g., Eckman, 1977), based on the idea that unmarked items are acquired earlier than marked items, that the difficulty of acquiring RCs in L2 will follow the NPAH and the typological markedness will influence the SLA process. The NPAH was later applied to SLA as a universal hierarchy that predicts the difficulty order of RC acquisition in accordance with the Markedness Differential Hypothesis (MDH) (Eckman, Bell, & Nelson, 1988). Many experimental studies have been conducted on the L2 acquisition of postnominal RCs, mostly English but also a few European languages, and it appears that there is a general agreement in the field that the acquisition or processing difficulty of RCs follows the NPAH effect.

However, there has not been much research of the NPAH effect on languages with prenominal RCs, such as Korean, and it has not been precisely proved whether the NPAH effect can predict the acquisition or processing of RCs in prenominal RC languages. This means that we still do not know whether the NPAH can universally predict the learning or processing difficulty of RCs, and it is therefore essential to investigate the NPAH effect on prenominal RCs. In addition to the lack of studies on the L2 acquisition of prenominal RCs, an extended look at research on the syntactic features of relative clauses (RCs) in Korean to test typological universals is

particularly important regarding teaching Korean as a foreign language: First, according to Lee (1993), relative clause constructions are the third most frequently used among complex sentence constructions in Korean. In terms of language fluency, foreign learners of Korean can gain better awareness of the language by learning relative clause constructions, which will help them process and produce a wider range of sentence constructions. Second, teaching Korean as a foreign language has over-focused on the morphological aspects of Korean relative clauses without much consideration of the syntactic and pragmatic features (Kim, 2007). Currently, major Korean textbooks published by leading institutions inside and outside Korea adopt very similar methodological patterns and teaching orders of relative complementizers which signal the tense of the relative clause. The major task of teaching of relative clauses in Korean has therefore exclusively centred on accurate uses of the relative complementizers. The main drawback of such an approach is that the teachers cannot actually observe how the learners process or produce the structure of relative clauses. Most importantly, the significant syntactic differences of relative clauses in Korean and their students' first language(s) should be carefully considered to avoid failure in teaching the target language in typologically different language contexts (Ju, 2012).

Apparently, the NPAH effect should be tested against typologically diverse languages such as Korean, Japanese and Chinese, and the reason that the two types of RCs (in European languages and in East Asian languages) are so different should be carefully investigated. In this respect, a particularly important proposal in linguistic typology has recently developed by Comrie. Comrie's new typology of noun-modifying clauses in East Asian languages will be discussed in the next section.

3.3.1 Comrie's typology of noun-modifying clauses in East Asian languages

The conflicting results reported from studies on relative clauses in East Asian languages, such as Korean, Japanese and Chinese, could provoke interesting inquiry with regard to Comrie's new proposal (1998, 2002) based on Matsumoto's work (1997). As briefly mentioned in the previous chapter, one possible answer to the question about the reason which results in the differences of the two types of RCs (in European languages and in Asian languages) might come from Comrie (1996, 1998, 2002), one of the original proponents of the NPAH, who recently proposed a new typology of noun-modifying clauses. Comrie classifies languages broadly into two groups: one with RCs and the other with attribute clauses, which used to be considered RCs. Building on Matsumoto's (1988, 1997) work on Japanese noun-modifying clauses, Comrie argued that noun-modifying clauses in many Asian languages (e.g., Ainu, Chinese, Japanese, and Korean) are structurally different from RCs in European languages and that they should be distinguished from RCs and classified as *attributive clauses*. Relative clauses in European languages are assumed to involve a gap as in (3.8a), and many linguists treat Korean and Japanese equivalents likewise, as in (3.8b) and (3.8c):

(3.8) a. the book [which the student bought ___]

b. [haksayng-i ___ san] chayk (Korean)

c. [gakusei-ga ___ katta] hon (Japanese)

student-Nom bought book

Comrie (2002) proposed that noun-modifying clauses in Japanese, Korean and many

Asian languages have the structure of merely "attaching a modifying clause to a head noun" (2002: 31) and that their acceptability depends not on structural factors but on whether a native speaker (NS) can readily establish a plausible interpretation. Comrie's argument is based on three pieces of evidence: First, in languages that allow zero anaphora, there is no need to argue that there is a gap that corresponds to the relativized NP. Second, attributive clauses can have the same function as the *fact-S* construction in English (e.g., *the fact that the man is married)* in addition to putative RCs (e.g., *the man who married*) with no syntactic difference. Third, Japanese and Korean seem to lack syntactic constraints, such as the subjacency condition, on the relation between the head noun and the covert coreferential noun in the subordinate clause.

Comrie's new proposal raises many theoretical and empirical questions about the acquisition and processing of modifying clauses in these languages. The fundamental question would be whether the NPAH effect could still be observed if the relativized head and the gap in the RC are not coindexed by syntactic operations but loosely adjoined and pragmatically interpreted as in attributive clauses. In this respect, Comrie's proposal is significantly important because most studies on RC acquisition and processing in psycholinguistics and SLA virtually have treated noun-modifying clauses in East Asian languages as same as European-type RCs and tried to test universalist hypotheses such as the filler-gap hypothesis (e.g., Hsiao & Gibson, 2003; Miyamoto & Nakamura, 2003). Previous studies on relative clauses in East Asian languages with regard to the NPAH effect will be reviewed in the next section.

3.3.2 Review of second language research on relative clauses in East Asian languages

Given the research bias towards European-type RCs briefly discussed in Section 3.2.3, few studies so far have investigated the acquisition or processing of prenominal RCs or non-European languages, and it has been revealed that these studies do not necessarily or strictly support the predictions of the NPAH effect. Tarallo and Myhill (1983), in a crosslinguistic study that investigated RC acquisition by L1 English learners (N = 99), used a grammaticality judgment task and found that acquisition of postnominal RC languages (German, Portuguese, Persian) followed the NPAH, in that SU was easier than direct object (DO), whereas in prenominal RC languages (Chinese and Japanese), DO was easier than subject (SU). Specifically, in their combined analysis of Chinese and Japanese results, the accuracy order concerning the judgments of unacceptable sentences was: DO > oblique (OBL; with *in)* > IO > SU > OBL (with *with).*

Other studies of Japanese have shown conflicting results. Sentence combination tasks were used by Sakamoto and Kubota (2000) and Roberts (2000) to examine learners' acquisition of RCs in L2 Japanese. Sakamoto and Kubota employed a sentence-combining task to test the preferences of 19 Japanese as a second language (JSL) learners with various L1s (English, Chinese, Indonesian) for combining sentences with RCs. The learners in their study were presented with two individual sentences and two possible ways of combining them using RCs; responses were analyzed to determine which patterns of combination were preferred by the learners. Sakamoto and Kubota found support for the NPAH predictions for SU, DO, and IO, in that, given the choice, learners tended to select the more unmarked RC type over

the more marked RC type. For example, when they had a choice between SU and DO, the learners chose SU more often. However, there was no such preference with regard to OBL; that is, learners did not necessarily produce other unmarked RC types more than OBL, even though OBL-type RCs are predicted to be much less preferred than RCs higher on the hierarchy.

Roberts (2000) conducted two types of experiments – a sentence combining task and a comprehension task – with 68 learners (L1 English) of Japanese as a foreign language (JFL). They were randomly assigned to a control group or one of three experimental groups, which then received a variety of instruction treatments. The results showed a clear effect of task type. The sentence combining task showed a mixed result in terms of NPAH prediction, in that DO was more difficult than OBL or IO for the participants in the study representing the accuracy order of SU > IO = OBL > DO = GEN. On the other hand, the comprehension tasks showed that SU relatives is the most difficult, which runs completely counter to the predicted NPAH accuracy order representing the different accuracy order of IO > DO > GEN > OBL > SU.

In contrast, Kanno (2000, 2001) only compared SU and DO, and the results were consistent with the NPAH. Kanno (2000) tested comprehension of RCs by asking 94 JFL learners to choose the correct picture after hearing a NP such as *onnanohito-o miteiru otokonohito* "a man who is looking at a woman." The accuracy order of SU > DO and the error pattern (i.e., learners more frequently misinterpreted DO relatives as SU relatives than vice versa) were consistent with the NPAH effect. Kanno (2001) measured the reading times of SU and DO relatives by 17 JFL learners and found that SU relatives were read significantly faster than DO relatives, which is also consistent with the NPAH prediction.

Hasegawa (2005) investigated RC acquisition by 36 child JSL learners (L1 Chinese, Vietnamese, Lao, Khmer), using an oral picture-description task. The accuracy order obtained was SU = locative oblique (OBL) > instrumental oblique (OBL) > DO. SU was the easiest for the participants, which is consistent with the NPAH. However, OBL was not significantly different from SU, and DO was more difficult than both types of OBL, which is not consistent with the NPAH.

Ozeki and Shirai (2007a) conducted two types of studies and tested the predictions of the NPAH for Japanese. Study 1 analyzed RCs in an oral interview corpus from 90 learners of Japanese at four different levels of proficiency (first language = Mandarin Chinese, English, and Korean; N = 30 for each). Analysis of 1005 RCs from non-native data and 231 RCs from 15 native speakers (NSs) of Japanese revealed that even lower proficiency learners used direct object (DO) and oblique (OBL) relatives, suggesting that subject (SU) relatives are not easier than DO or OBL relatives for second language learners of Japanese. The learners (except Korean NSs) also made strong associations between SU and animate heads and between DO/OBL and inanimate heads. Study 2 employed a sentence-combining experiment. Fifty NSs of Cantonese studying Japanese in Hong Kong took the test, which controlled for the animacy of head noun phrases and arguments of the verbs. Results revealed no significant difference between SU and DO, which were both easier than OBL, with only a minimal effect of animacy. However, errors of converting DO and OBL target items into SU relatives almost exclusively involved animate-head items. Ozeki and Shirai finally suggested that the NPAH does not predict the difficulty order of Japanese RCs, and that learners use different types of RCs based on the animacy of the head noun.

Similarly, research on Korean RCs so far has shown mixed results. Among them,

two experimental studies of Korean acquisition (Cho, 1999; O'Grady, Lee, and Choo, 2003) reported findings consistent with the NPAH effect. For instance, Cho's study of the L1 Korean learning of children between 4 and 7 years of age showed that the children comprehended SU better than DO, IO, and OBL RCs and produced more well-formed SU constructions than others. O'Grady, Lee, and Choo's (2003) study of the interpretation of SU and DO RCs by L2 learners of Korean yielded similar results. O'Grady, Lee, and Choo tested comprehension of Korean RCs by 53 English L1 learners of Korean as a foreign language (KFL). They employed the same method used by Kanno (2000); that is, they had participants listen to NPs that consisted of a RC and a head noun and choose the picture that matched what they had just heard. They obtained the same results: The L2 learners performed significantly better on SU than on DO. Learners made significantly more errors in comprehension with DO than with SU relatives and they made more errors of misinterpreting DO as SU than vice versa. Individual performances also showed an implicational pattern; most of the participants who correctly interpreted DO also correctly interpreted SU. The findings of both studies support not only the NPAH but also the Structural Distance Hypotheses (O'Grady, 1997); that is, it is the number of syntactic nodes that are traversed to link the head noun and the gap, not the adjacency between the head and the gap, which influences on the relative ease or difficulty of RC gaps. With the prenominal position of noun-modifying clauses and SOV Korean word order, DO is closer to the head than SU, but it still proved more difficult than SU. The Structural Distance Hypothesis (SDH) will be discussed further along with the Linear Distance Hypothesis (LDH) in Section 3.4.6.

On the other hand, Jeon and Kim (2007) suggested how the NPAH intersects with the typological characteristics of Korean in the acquisition of relative clauses (RCs)

is influenced by the type of RC construction. It has been known that there are two types of RC constructions in Korean: head-external and head-internal. The head-external relative has its head to the right of the RC, whereas the head-internal relative has its lexical head in the RC and is marked by the complementizer *kes*. In L1 development, it has been observed the head-internal type emerges earlier than the head-external type. Jeon and Kim investigated how the use of the two types of RCs interacts with the NPAH, with a focus on subject (SU) and direct object (DO) RCs in L2 Korean development. Oral production data were collected from 40 learners of Korean as a foreign language. The results showed that there was an advantage for SU over DO in the head-external RC and that the head-external construction was preceded by headless and head-internal constructions. Based on the results, Jeon and Kim suggested that a head-external RC in Korean involves the syntactic mechanism of linking the head and the gap relation, whereas this might not be the case for a head-internal RC. Jeon and Kim, thus, concluded that DO constructions are more difficult than SU constructions in head-external RCs in Korean, whereas the asymmetry does not necessarily exist for the head-internal RCs.

With regard to L1 Chinese RC acquisition, Matthews and Yip (2002) investigated the development of RCs in Cantonese-English bilinguals. Matthews and Yip showed that, contrary to the NPAH prediction, the Cantonese-dominant bilingual children in their study produced DO relatives earlier than SU relatives. Moreover, their English RCs also emerged from DO relatives, presumably under the influence of the more dominant Cantonese.

However, different results from L1 Chinese speakers were reported by Kweon and Lee (2008) recently. Regarding the different subject/object asymmetry of RC construction between the learners' L1 (Chinese) and L2 (Korean), Kweon and Lee

examined on-line processing data from the relative clauses in L2 Korean by L1 Chinese speakers. They found that subject relative clauses were easier than object relative clauses in L2 Korean by Chinese speakers. They finally suggested that the NPAH plays prominent roles in the processing of relative clauses in Korean as a second language by Chinese learners.

The mixed data from East Asian languages presented so far constitute an important addition to the cross-linguistic literature on the acquisition and processing of RCs, which has been heavily biased toward English and other European languages. Studies on RC acquisition can thus be summarized as follows: Regarding postnominal RC languages (English, Swedish, Italian, and French), the NPAH effect has been consistently supported, whereas the results for prenominal RC languages (Japanese, Korean, and Chinese) have been inconsistent. In the following section, some factors, which presumably cause the conflicting results in post and prenominal RCs, will be discussed in depth with reference to cross-linguistic data.

3.4 Controversial issues in research on relative clause acquisition in East Asian languages

3.4.1 Prenominal features of relative clauses

A question then arises whether the inconsistent results are caused by prenominal features of RCs in Japanese, Korean and Chinese and whether all prenominal RCs behave similarly in terms of the NPAH effect. Actually, this is not the case: The prenominal versus postnominal distinction might not be very important for the different patterns of relative clause acquisition if we look at the results from studies

on Turkish, which is another prenominal RC language without a relative pronoun.

Slobin (1986), who analyzed natural conversation data from 57 children acquiring Turkish, found a strong SU primacy. The ratio of SU relatives among all RCs was 94% for 3-year-olds and 90% for 4-year-olds, even though adults' use of RCs was not restricted to SU to such an extent (68% in child-directed speech and 63% in adult-directed speech). This shows that the prenominal RC does not always result in a lack of SU primacy.

In Turkish, there are two types of relative clauses: non-finite relative clauses with participle suffixes and finite relative clauses with *ki*. The type of non-finite relative clauses are the most typical in Turkish and has one of the participle suffixes *–(y)An*, *-DIK*, or *–(y)AcAK*, which correspond to the relative pronouns *who*, *which*, *that*, *whom*, *whose*, etc. in English. However, the range of finite relative clauses involving the complementizer *ki* is relatively very limited and all relative clauses other than *ki* clauses are prenominal. A major difference between East Asian languages, such as Japanese, Korean and Chinese, and Turkish RCs is that, in Turkish, a nominalizing suffix is attached to the verb stem in the RC and different suffixes are used depending on whether the RC is SU. With the participle suffixes, subjects, direct objects, oblique objects, and possessors can be relativized in Turkish, as in (3.9) to (3.12) below:

(3.9) Subject:

[burada sat-ıl-**an**] kitap-lar

here sell-Pass-Part book-PL

'the books [(*which* are) sold here]'

(3.10) Direct Object:

[bil-**diğ**-im] bir turizm şirketi

know-Part-1SG.Poss a tourism agency

'a tourist agency [(*that*) I know]'

(3.11) Oblique Object

[Turhan-ın et-i kes-**eceğ**-i] bıçak

Turhan-Gen meat-Acc cut-Part-3SG.Poss knife

'the knife [*with which* turhan will/would cut the meat]'

(3.12) Genitive

a. [araba-sı çal-ın-**an**] komşu-muz

car-3SG.Poss steal-Pass-Part neighbor-1PL.Poss

'our neighbor [*whose* car was stolen]'

b. [usta-nın kapı-sın-ıdeğiştir-**eceğ**-i] çamaşır makinası

engineer-Gen door-3SG.Poss-AC change-Part-3SG.Poss washing machine

'the washing machine [*of which* the engineer is/was going to change the door]'

(examples adopted from H. Kim, 2008)

As shown above, thus, even though Turkish RCs are prenominal, like RCs in East Asian languages, the syntactic role of the head noun in the Turkish RCs results in formal differences.

In contrast to Turkish, in East Asian languages, syntactic roles of the head noun in the RC cause no formal differences either syntactically or morphologically. Based on this and other observations, Comrie (1996, 1998) claimed that Turkish has RCs – not

attributive clauses – although some other Turkic languages have attributive clauses. Therefore, the fact that RCs in Korean and Japanese are not strongly constrained by grammatical relations can be explained by assuming that attributive clauses are not constrained by grammatical relations, not because East Asian languages have prenominal RCs.

3.4.2 Pseudo-RCs

It seems that the contrasting results of some studies addressed in Section 3.3.2 show consistency with Comrie's claim discussed in Section 3.3.1. If RCs in East Asian languages do not involve a syntactic operation and if their formation is semantically and pragmatically (not syntactically) constrained, then it is not surprising that the production of putatively marked RCs (or perhaps we should say attributive clauses), such as OBL relatives, is not very difficult for Japanese learners whose L1 is English, which is renowned for following the NPAH (see Tarallo and Myhill, 1983; Roberts, 2000; Ozeki & Shirai, 2007a).

With regard to semantic and pragmatic constraints, there are special noun-modifying clauses for which grammatical relations cannot be determined in Korean and Japanese as follows:

(3.13) [John-i cwuk-ess-ta-nun] nyusu (Korean)
[John-ga sinda] nyuusu (Japanese)
John-Nom died news
"the news [that John died]"

(3.14) [John-i ket-nun] soli (Korean)

[John-ga aruku] oto (Japanese)

John-Nom walk sound

"the sound [of John's walking]"

Example (3.13) and (3.14) do not and cannot receive relative clause interpretation. Rather, example (3.13) corresponds to noun-complement clauses in English. Example (3.14) does not correspond to noun-modifying clauses in English and is called a pseudo-relative clause. In the English translation of (3.13), the subordinate clause can clearly be shown not to be a relative clause, for instance in that *that* cannot be replaced by *which*. In the English translation of (3.14), a finite subordinate clause is not even possible.

These two examples are not related to any of the two general characteristics of RCs: First, they are a distinct construction type that can be identified as "relative clause", and, second, there is a clear syntactic link between the main clause and the relative clause (Comrie, 2002). Generally, relative clauses can be analyzed syntactically as a clause modifying a noun phrase in the main clause. There is a notional head that is shared by both clauses, that plays a syntactic role in both clauses. However, the semantic range of the examples (3.13) and (3.14) goes well beyond the characteristics of RCs claimed by Comrie as above. Therefore, as Matsumoto (1997) proposed, these examples obviously represent that constraints on Korean and Japanese relative clause formation are actually of a semantic and pragmatic rather than a syntactic nature, as is generally the case for RCs in many European languages.

3.4.3 L1 transfer

Another controversial issue in RC acquisition is L1 transfer. As addressed in Chapter 3.2.3, the results of several studies with European postnominal RCs have consistently supported the NPAH. In terms of language transfer, there are two possibilities of such problems. One possibility is that European languages follow the NPAH regardless of learners' L1s, whereas Asian languages are not so strongly constrained by the NPAH and the effect of L1 figures more prominently. The other possibility is that L1 effect is strong even in the acquisition of RCs in European languages, and previous research simply did not focus on its effect (see Shirai and Ozeki, 2007). With any of these possibilities, nevertheless, results with East Asian prenominal RCs have been clearly inconsistent regardless of linguistic similarities within them.

In reverse, if a pair of languages subjected to RC research in SLA has same word order typologically, the similarity will rather work as a significant advantage in the research because research variables caused by differences between the languages will be minimized. The Table 3.1 below provides an overview of the relevant word order properties of English and the three East Asian languages mostly considered so far:

Table 3.1. Basic word order and position of RCs (Diessel, 2007)

Language	Basic word order	Position of RC	Head-internal RC
English	SVO	Postnominal	No
Korean	SOV	Prenominal	Yes
Japanese	SOV	Prenominal	Yes
Chinese	SVO	Prenominal	No

If we look at the word order of (externally headed) RCs in the two SOV language (Japanese and Korean), we find that SU relatives do not have the canonical word order (also known as SVO word order) like SU relatives in English do as shown in the following Table 3.2:

Table 3.2. RC word order deviated from the basic word order

	SU relatives	DO relatives
English	NP [that V NP] = SVO	NP [(that) NP V] = OSV
Korean	[_ NP V] NP = OVS	[NP _ V] NP = SVO
Japanese	[_ NP V] NP = OVS	[NP _ V] NP = SVO
Chinese	[_ V NP] NP = VOS	[NP V _] NP = SVO

As shown above, both SU relatives and DO relatives in Korean and Japanese involve the same RC word order that deviates from the basic word order, which are different from RC word orders in English and Chinese. This common feature might explain why the acquisition and processing of SU relatives does not appear to be easier than the acquisition and processing of DO relatives in Korean and Japanese.

3.4.4 Animacy

Animacy has also been an important factor in RC acquisition. In European languages, recent research has revealed strong effects of the animacy of the head nouns involved. Studies have shown that native speakers of Dutch (Mak et al., 2002) and English (Traxler, Morris, & Seely, 2002; Weckerly & Kutas, 1999) are heavily influenced by the animacy of head nouns in their comprehension of RCs. For example, when DO relatives have an inanimate head noun and the agent is animate

(e.g., *the book that John bought*), their difficulty is not significantly different from that of SU relatives. However, when the head is an animate referent, DO relatives are much more difficult than SU relatives. This might reflect the higher frequency of SU relatives with animate head nouns and DO relatives with inanimate head nouns in discourse, as shown by Mak et al. (2002) in their analysis of German and Dutch newspaper corpora.

Similar effects of animacy also appear in East Asian RCs. For instance, Ozeki and Shirai (2007a) observe that L2 learners of Japanese tend to associate SU relatives with animate head nouns, whereas DO relatives were mostly attached to inanimate head nouns. Similarly, Jeon and Kim (2007) report that the Korean L2 learners in their experiment produced many errors if they were supposed to use a DO relative headed by an animate referent as the head of the RC. Kanno's (2001) study also shows that L2 learners of Japanese have great difficulties with relative clauses which include two animate references.

With regard to the acquisition and processing of RCs, the matter of animacy is an important semantic factor because it correlates with grammatical relations in a certain language. Across languages, subject and object are associated with particular semantic roles. In a prototypical transitive clause, the subject functions as actor or agent of an activity that affects the entity encoded in the direct object. Because the agent is an intentional being, the subject of a prototypical transitive clause tends to be animate, whereas the object is usually an inanimate entity. However, in intransitive clauses, the subject is not associated with a particular semantic role. With unergative verbs, the intransitive subject tends to be animate, but with unaccusative

verbs, the subject is often an inanimate entity (Diessel, 2007: 317).[13] As these grammatical relations across languages can affect the results of research, the effect of animacy should be carefully considered along with other controversial factors when conducting research into RC acquisition and processing and when developing test questions for research investigating the NPAH effect.

3.4.5 Methodological issues

Based on the review of the literature and the results reported in the previous research, a different methodology appears to yield quite different results. One significant trend is that comprehension studies are affected by various extraneous variables, whereas

[13] Unergative verbs and unaccusative verbs are subtypes of intransitive verbs. Semantically, unergative verbs have a subject perceived as actively initiating or actively responsible for the action expressed by the verb (e.g. *run, talk, dance, walk, work* etc.). On the other hand, unaccusative verbs have a subject which does not actively initiate or is not actively responsible for the action of the verb (e.g. *arrive, fall, burn, melt* etc.); rather, it has properties which it shares with the direct object of a transitive verb (or better, with the grammatical subject of its passive counterpart).

Both unaccusatives and unergatives only take one argument. Syntactically, unergative verbs are characterized as verbs with an external argument and unaccusative verbs assign no external theta-role and no structural case. The sole argument of the unergative is agentive whereas the sole argument of the unaccusative is a theme as shown in the following Korean examples:

(a) Unergative
ku-nun ppalli kel-ess-ta.
He-Top quickly walk-Past-Dec
'He walked fast.'

(b) Unaccusative
kang-i el-ess-ta.
river-Nom freeze-Past-Dec
'The river froze.'

Cross-linguistically, there is evidence for a universal linking rule in relation to the canonical mapping of the thematic roles associated with verbs onto to the syntactic positions in a clause (Bowerman, 1982; Bresnan, 1982; Jackendoff, 1972; Pinker, 1984). Universally, agents typically map onto the subject position and themes/patients map onto the direct object position. As (a) illustrates, the sole argument (agentive) of an unergative verb is mapped onto to the subject position. In the case of an unaccusative verb, however, as shown in (b), there appears to be a mismatch between the theta role (i.e. theme) borne by the sole argument and its position in the surface syntax (i.e. subject). See J. Kim (1993, 1999) and K. Park & Lakshmanan (2007) for more information on the unaccusative-unergative distinction with reference to Korean.

production studies (including sentence combination tasks) tend to be more consistent with the NPAH. One possible reason for this is that learners might have freedom to produce what they prefer to produce in production tasks even if researchers intend to have them produce particular structures, which results in a more direct reflection of their current ability. In contrast, in a comprehension study, it is very difficult to tell why a particular answer is chosen. It is even possible that learners do not process given strings as RCs but process them as simple sentences although researchers assume that all learners process such input as RCs. In contrast, things are more transparent in the case of production data: If the learner cannot form a RC, this is evident in nontargetlike surface forms.

This difficulty might be reflected not only in the NPAH studies undertaken on Asian languages but also in those on European languages. Two studies (Izumi, 2003; Hansen-Strain & Strain, 1989) used comprehension tasks in testing the NPAH in European languages, and both employed a multitask design. Izumi used grammaticality judgment, sentence combining, and comprehension tasks with the same L2 English learners. He found that sentence combination and grammaticality judgment tasks partially supported the NPAH, with SU found to be significantly easier than DO, but there was no difference between DO and the object of a preposition (i.e., OBL). Izumi did not find support for the NPAH in the comprehension task because the effect of the RC type was not significant. Hansen-Strain and Strain used seven tasks: listening comprehension, oral picture description, oral retelling, written retelling, essay, sentence combining, and grammaticality judgment. They interpreted the results from learners with five different L1s (Samoan, Tongan, Japanese, Korean, and Chinese) to be generally consistent with the NPAH, except for GEN. A closer look, however, reveals that the accuracy scores from the

comprehension task (on a 6-point scale) are somewhat problematic; although SU (3.62) was easier than DO (2.7), it was no different than IO (3.58), which is predicted to be much more difficult than SU. Thus, it appears that even in English, results from comprehension tasks do not necessarily support the NPAH.

Therefore, to address the issues of whether East Asian languages follow the NPAH, we should ensure the systematical consistency of research methodologies with European language studies. Given that results of comprehension tasks are not always consistent with the NPAH, even in English, as shown above, the first task we should focus on is to employ a multitask design which involves processing and production tests, and pursue a cross-linguistic study using the methodological instruments and comparable participants in two (or more) European and East Asian languages to investigate if both groups of languages follow the NPAH and, eventually, have typological universals.

3.4.6 Filler-gap dependency

Another factor that has often been suggested as relevant to the processing of relative clauses involves the length of the so-called *filler-gap dependency* that holds between a modified nominal (filler, the head of the relative clause) and the position at which it can be associated with the verb's conceptual structure (gap). It has been repeatedly demonstrated that such dependencies place a burden on the processor, thereby increasing the burden on working memory. In other words, the difficulty of processing a relative clause increases with the length of the filler-gap dependency as it requires a constant effort to relate the filler to the appropriate [resolution] site (J. Hawkins, 2004: 173). The key insight of filler-gap dependency, summarized by

Grodner & Gibson (2005: 262), is that mental representations become degraded over time or with more input and the difficulty of computation is, in part, determined by the amount of lexical materials intervening between the filler and the gap. Therefore, the longer the distance between the gap and the relativized element, the more difficult comprehension of the relative clause is presumed to be. As for the precise calculation of the distance, the literature on SLA offers two proposals – Linear Distance Hypothesis (LDH) and Structural Distance Hypothesis (SDH). These two distinct proposals in the L2 literature are associated with attempts to explain the NPAH effect based on the idea that differential processing difficulties are linked to different gap positions.

The Linear Distance Hypothesis (LDH), put forward by Tarallo and Myhill (1983) and R. Hawkins (1989), is that the difficulty of relative clauses can be predicted by the linear distance between the gap and the head. The fundamental premise underlying the LDH is that it is difficult for the human language processor to keep the filler in working memory until it encounters the gap. The longer the retention of the unresolved filler-gap dependency, the harder the RC is to parse.

There are different ways to implement this idea. One possibility is simply to count the number of intervening words of any type, as illustrated in (3.15). In these and other examples, the head of the relative clause is underlined and the matching gap inside the relative clause is indicated by a dash:

(3.15) a. Subject RC

1

the woman that [_ sees the man]

linear distance between the gap and the head = 1 word

b. Direct object RC

1 2 3 4
the woman that [the man sees _]

linear distance between the gap and the head = 4 words

As shown in (3.15), the subject gap in the relative clause (3.15a) is linearly closer to the head noun than its direct object counterpart (3.15b) representing that the structure of subject RCs is less complex than object RCs in terms of processing.

Another possibility, developed in much more detail by Gibson (Babyony-shev & Gibson, 1999: 425-426), is that only elements that introduce new discourse referents – NPs and main verbs – enter into the calculation. As can be seen by reconsidering the clauses in (3.15), this approach also yields the same prediction that subject relatives should be easier than direct object relatives, given the shorter distance shown in (3.16):

(3.16) a. Subject RC

0
the woman that [_ sees the man]

linear distance between the gap and the head = 0 words

b. Direct object RC

1 2
the woman that [the man sees _]

linear distance between the gap and the head = 2 words

Consistent with its processing advantage, the filler-gap dependency in the subject relative clause in (3.16a) can be resolved at minimal cost to working memory, as the

sole intervening element (the complementizer *that*) does not introduce a discourse referent. In contrast, two elements with new discourse referents – the NP *the man* and the verb *see* – intervene between the filler and the gap in the direct object relative clause in (3.16b). Therefore, the distance factor can be informally paraphrased as follows:

> The difficulty of processing a relative clause increases with the length of the filler-gap dependency (calculated in terms of intervening new discourse referents). (O'Grady, 2011: 22)

Basically, both metrics of linear distance account for same prediction that subject relative clauses are easier to process than direct object relative clauses. However, I am going to take Gibson's approach when applying the LDH to Korean because the notion of *words with discourse referents* closely corresponds to word phrases (*ecel*) rather than lexical or grammatical morphemes (*tane*) in Korean.[14] With this approach, the verb suffix *–(u)n* in Korean, which simultaneously indicates both tense and clause type, should not be counted as an element that intervenes between the gap and the head, just as its functional counterpart in English, the complementizer *that*,

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[14] Here, we need to choose word phrases (*ecel*) or lexical or grammatical morphemes (*tane*) as a unit of analysis in order to estimate linear distance in Korean. Korean is an agglutinative language and, in Korean, a sentence is made up of word phrases delimited by spaces. A word phrase in turn is composed of one or more lexical morphemes concatenated by zero or more grammatical morphemes. See the following sentence:

e.g. namca-lul po-nun yeca-ka yeyppu-ta.
man-Acc see-Rel.Prs woman-Nom pretty-Dec
'the woman who sees the man is pretty.'

The sentence above is made up of four word phrases and eight morphemes. As both metrics of linear distance also account for the same prediction in Korean, adopting *ecel* as a unit of analysis would simplify the counting of intervening words in linear distance while meeting requirements to be *words with discourse referents* by Gibson at the same time.

does not introduce a discourse referent[15]. This will be explained further with Korean examples (3.18) later in this chapter.

On the other hand, the Structural Distance Hypothesis (SDH) proposes that contrasts in the difficulty of subject and direct object relative clauses can be attributed to differences in the depth of embedding of the clause-internal gap (O'Grady, 1987, 1997; O'Grady, Lee, and Choo, 2003). According to O'Grady's (1997: 179) proposal, the difficulty of relative clauses can be predicted by nodes intervening between the gap and the head of the relative clause. In other words, the more deeply a NP is embedded, the harder it is to relativize. Therefore, the SDH predicts a universal subject advantage because the structural embedding pattern (i.e., objects are more deeply embedded than subjects) presumably holds across all languages.

As can be seen by comparing the sample syntactic representations in (3.17), the subject gap in a relative clause is not just linearly closer to the head noun than its direct object counterpart; it is also less deeply embedded and, therefore, the structural distance between the gap and the head is greater in a direct object relative clause than in a subject relative clause:

(3.17) a. Subject RC

the woman that [**S** _ sees the man]

structural distance between the gap and the head = 1 node (S)

linear distance between the gap and the head = 0 words

b. Direct object RC

the woman that [**S** the man [**VP** sees _]]

[15] See Section 2.4.1 for more information about the forms of relativizers in Korean and English.

structural distance between the gap and the head = 2 nodes (VP, S)

linear distance between the gap and the head = 2 words

As can be seen by comparing the syntactic representations in examples (3.17), the structural distance between the gap and the head is greater in a direct object relative clause than in a subject relative.

In English, the Linear Distance Hypothesis (LDH) and the Structural Distance Hypothesis (SDH) generate the same predictions about subject and object relative clauses as shown in (3.17). Therefore, determining which of these views is correct is no easy task in English, where structural distance and linear distance are muddled in the manner illustrated in (3.17). In other words, it is unclear whether this preference in English should be attributed to structural factors or to a linear distance effect. Interestingly, however, this difficulty is neutralized in languages with a different typological profile, such as Korean, Japanese and Chinese.

In Korean and Japanese, relative clauses precede the noun that they modify. This allows us to disentangle the effects of linear and structural distance, since a subject gap is structurally closer to the head than is a direct object gap but is linearly more distant as shown in Korean example (3.18) and Japanese example (3.19):

(3.18) Korean

a. Subject RC

1 2

[**S** _ namca-lul po-nun] yeca

man-Acc see-RC.Prs woman

'the woman who sees the man'

structural distance: 1 node (S)

linear distance: 2 words

b. Direct object RC:

1
[**S** namca-ka [**VP** _ po-nun]] yeca

man-Nom see-RC.Prs woman

'the woman who the man sees'

structural distance: 2 nodes (VP & S)

linear distance: 1 word

(3.19) Japanese

a. Subject RC

1 2
[**S** _ otokonohito-o miteiru] onnanohito

man-Acc see woman

'the woman who sees the man'

structural distance: 1 node (S)

linear distance: 2 words

b. Direct object RC:

1
[**S** otokonohito-ga [**VP** _ miteiru]] onnanohito

man-Nom see woman

'the woman who the man sees'

structural distance: 2 nodes (VP & S)

linear distance: 1 word

As scrutinized in (3.18) and (3.19), the SDH predicts that subject relatives will be easier than direct object relatives in Korean and Japanese, just as they are in English. In contrast, the LDH predicts that direct object relatives should be easier.

Chinese is a peculiar case regarding its typological profiles. Chinese is like English in employing SVO order, but unlike it in placing its relative clause before the noun that they modify, which is the same as Korean and Japanese. As shown in (3.20), the morpheme *de* markes a clause that combines with a nominal:

(3.20) Chinese

a. Subject RC

1 2
[**S** _ yaoqing fuhao] de guanyuan

invite tycoon DE official

'the official who invited the tycoon'

structural distance: 1 node (S)

linear distance: 2 words

b. Direct object RC:

0
[**S** fuhao [**VP** yaoqing _]] de guanyuan

tycoon invited DE official

'the official who the tycoon invited'

structural distance: 2 nodes (VP & S)

linear distance: 0 words

(example adopted from O'Grady, 2011)

As illustrated in (3.20), what makes Chinese relative clauses especially intriguing is

the fact that structural distance and linear distance are no longer confounded: subject relative clauses such as (3.20a) enjoy only a structural distance advantage, whereas direct object relative clauses such as (3.20b) enjoy only a linear distance advantage. Therefore, the effect of the LDH and the SDH in Chinese is consistent with Korean and Japanese.

Finally, the preferred RC types predicted by LDH and SDH in English, Korean, Japanese and Chinese are summarized in Table 3.3:

Table 3.3. Preferred RC types in Linear and Structural Distance Hypothesis

	LDH	SDH
English	favors subject relative	favors subject relative
Korean	favors direct object relative	favors subject relative
Japanese	favors direct object relative	favors subject relative
Chinese	favors direct object relative	favors subject relative

As briefly mentioned earlier, it is not easy to determine whether it is the LDH or the SDH which contributes to the processing preference in relative clauses by investigating the acquisition of relative clauses in English as a second language. In English, the LDH and the SDH generate the same predictions about subject and object relative clauses and, accordingly, this may have led SLA researchers to the same conclusion that subject relative clauses easier to produce and comprehend than direct object relative clauses. However, the fundamental claims the LDH and the SDH make about the factors relevant to developmental order in first and second language acquisition are certainly different: the LDH assumes perceiving systems as a linear array of words, whereas the SDH assumes computational operations as hierarchical syntactic representation.

In spite of the confounding issue, one of the most robust experimental findings in SLA is that English subject relative clauses are easier to produce and understand than are direct object relatives (Doughty 1991; Eckman, Bell, and Nelson, 1988; Gass, 1979; Hamilton, 1994; and Wolfe-Quintero, 1992). Based on the consistent results in English, it has frequently been noted (e.g., Doughty; Eckman et al.) that the observed developmental facts parallel the implicational relationships in Keenan and Comrie's (1977) Noun Phrase Accessibility Hierarchy, which treats subject relatives as typologically less marked than direct object relatives. This raises the questions as to why the acquisition process should be sensitive to this difference, how the acquisition process and the difference of markedness are interrelated, and whether such effect of markedness on RC acquisition is particular to English or cross-linguistically universal.

Hence, alternatively, it may be worthwhile to investigate the acquisition of relative clauses in Korean as a second language with learners from typologically different first language backgrounds, such Japanese, Chinese and English, to shed light on the factors that affect the processing of relative clauses.

3.5 Summary

This thesis aims to explore how morpho-syntactic and semantic-pragmatic aspects of Korean relative clauses (RCs) intersect with the effect of the Noun Phrase Accessibility Hierarchy (NPAH) in Korean and reconsider the order of difficulty in the processing and production of Korean relative clauses with regard to the Markedness Differential Hypothesis (MDH) (Keenan and Comrie, 1977; Eckman, 1977, 1985a). Chapter 3 explains the two implicational hypotheses of typological

universals, the Noun Phrase Accessibility Hierarchy (NPAH) and the Markedness Differential Hierarchy (MDH). Although the Accessibility Hierarchy was not meant to predict the acquisition order of relative clauses, it was hypothesized (Eckman, 1977), based on the idea that unmarked items are acquired earlier than marked items, that the difficulty of acquiring RCs in an L2 will follow the NPAH. This was borne out by many experimental studies with learners of languages that have post-nominal RCs; mostly English but also some European languages. From the results reported in previous studies of RC acquisition, it appears that the acquisition of RCs in English and European languages follows the predictions of the NPAH whereas the acquisition of RCs in East Asian languages does not necessarily follow the hierarchy. The conflicting results clearly signal the qualitative differences of the noun-modifying clauses in East Asian languages from the relative clauses in European language and, hence, it is probably too early to predict that the NPAH effect is typologically universal.

To achieve sound results from investigating qualitative differences of relative clauses between European languages and East Asian languages, the controversial issues, such as prenominal RC constructions, semantics and pragmatic constraints, L1 transfer, animacy, head-external and head-internal RCs, multitask and filler-gap dependency, should be thoroughly considered in designing experiments. Accordingly, the experiments 1 and 2 reported in Chapter 4 and 5 respectively are conducted to clarify 1) the applicability of the NPAH effect to L2 Korean, 2) the appearance of any effects of RC types and constructions, L1 transfer and animacy, and 3) the interaction of experimental methodologies and participants' performance in processing and producing noun-modifying clauses in Korean. Overall introduction to the two experiments will be outlined in Chapter 4.

CHAPTER 4

Experiment 1: Listening Comprehension Tasks

4.1 Introduction

One of the most controversial issues of previous studies carried out to test typological universals of relative clauses (RCs) in East Asian languages is that there is a large degree of variability in their research findings as addressed in Chapter 3. Although various types of methodologies have been employed in the experimental designs to find robust cross-linguistic evidence of the typological universals, it has been shown that different methodologies may have contributed to the mixed results which cannot provide a full explanation on the effect of the Noun Phrase Accessibility Hierarchy (NPAH), particularly when it comes to East Asian languages. Accordingly, this chapter and the subsequent chapter employ two mixed tasks to preserve methodological consistency with previous RC studies and, at the same time, to identify any biased interpretation on such conflicting results due to the methodological issues of RC processing and production studies: Listening Comprehension Tasks (LCT) and Picture Description Tasks (PDT). The need for such multitask design in RC studies will be discussed in detail in Section 4.2.

The main goal of Experiment 1 is to investigate whether Korean language learners' cognitive processing of Korean relative clauses is constrained by the NPAH hypothesis. In Experiment 1, Listening Comprehension Tasks (LCT, henceforth)

were used in order to access the learners' instant RC processing by measuring their reaction time and accuracy to different types of relative clauses in Korean. Thus, what was primarily manipulated within the stimuli in Experiment 1 is the type of relative clauses (RCs). The listeners' task was to perceive how the test RCs are parsed with regard to the grammatical role of their head nouns.

In the analysis of the results, I investigated 1) Which RC type is more accessible in reducing participants' reaction time across the six Korean RC types in the experiment (animate SU/inanimate SU/animate DO/inanimate DO/IO/OBL headed relative clauses) regarding the effect of NPAH; 2) Whether the participants' reaction time changes in the same pattern predicted by the NPAH over six RC types for the four different first language (L1) groups (Korean/Japanese/Chinese/English); and 3) (If not so,) why the difference(s) from NPAH was observed regarding the effect of animacy as well as RC types and L1 transfer.

The current chapter begins with grounds for the multitask design and a brief overview of the two different types of experiments and their intersecting functions for the purpose of the research. Details on participants, experimental materials, and experimental procedure are presented in Section 4.3. The statistical analysis and results are reported in Section 4.4, followed by discussion in Section 4.5. In the discussion, factors affecting participants' processing of Korean relative clauses are addressed in relation to these results. A conclusion with a summary of Experiment 1 can be found in Section 4.6.

4.2 Significance of multitask design in RC studies

As for RC studies in English and European languages, the major experimental

methodology they employed is either sentence combination tasks (Eckman et al., 1988; Gass, 1979) or grammaticality judgement tasks (Croteau 1995 in Italian; Mitchell 2001 in French). A few studies used oral picture-description tasks (Hyltemstam 1984 in Swedish; Pavesi 1986). In these studies, regardless of participants' first language (L1) or elicitation measures, the accuracy order followed the hierarchy of the NPAH. However, one significant trend of studies with English relative clauses is that comprehension studies are often inconsistent with the NPAH whereas production studies (including sentence combination tasks) tend to be more consistent with the NPAH effect (see Section 3.4.5).

Testing the NPAH with East Asian languages such as Korean, Japanese and Chinese has also produced mixed results not only for different East Asian languages but also individual languages. Recently, a body of research has been emerging to suggest that the NPAH is not observed in the acquisition of some Asian languages, such as Japanese as a first language (L1) and a second language (L2) (Ozeki & Shirai, 2007a), and Cantonese (Yip & Matthews, 2007). On the other hand, experimental studies of the acquisition of Korean relative clauses (Cho, 1999; O'Grady et al., 2003) reported findings consistent with the NPAH.

Particularly, in spite of the similarities of the RC construction in East Asian languages[16], different methodological trends have been adopted in the empirical studies on relative clauses in Korean, Japanese and Chinese, and their findings are remarkably different depending on the task(s) used: Studies that used a picture selection comprehension task (Hasegawa, 2007; Kanno, 2000, 2007; Lee & Lee, 2004; O'Grady et al., 2000, 2003), an elicited production task (Hasegawa, 2007;

[16] I call Korean, Japanese and Chinese the East Asian languages here. See Section 3.4.3 for more information about the similarities of RC constructions in Korean, Japanese and Chinese.

Jeon & Kim, 2007; O'Grady et al., 2000), or a sentence combination task (Kanno, 2000; Ozeki & Shirai, 2007a; Roberts, 2000; Yabuki-Soh, 2007) generally showed evidence for the NPAH effect. In contrast, studies that used grammaticality judgement tasks (Tarallo & Myhill, 1983), sentence combination tasks (Roberts, 2000; Yabuki-Soh, 2007), or naturalistic data (Ozeki & Shirai, 2007a; Yip & Matthews, 2007) showed little evidence for the NPAH effect.

In fact, the tasks used in previous studies are not perfectly designed without problems or limitations. First, processing and production of relative clauses can be different mechanisms in a first and second language(s) and, accordingly, the conflicting results of the previous studies on relative clauses in East Asian languages might be caused by different types of difficulties which the task(s) targeted. Second, even in tasks which target RC processing, it is not clear how a grammaticality judgment task and a sentence comprehension task can test the construct of processing difficulty. Given that incorrect grammaticality judgments or misinterpretations of an item could be due to metacognitive reasons other than sole processing difficulty, it seems unreasonable to conclude that these tasks fully measured the construct that underlies the NPAH effect. Naturalistic or spontaneous speech data also have limitations in that the mere emergence of a structure cannot be considered evidence of acquisition. The data may simply reflect the high contextual frequency of subject or object RCs in the discourse. Without an obligatory context for a particular structure, the emergence or usage in natural production can say little about the actual difficulties of subject RCs in compared to object RCs. As for a picture identification comprehension task, which is the most popular type of task used in previous studies, it is difficult to locate the exact locus of error. In this task, participants who do not know a given RC structure may randomly choose a correct

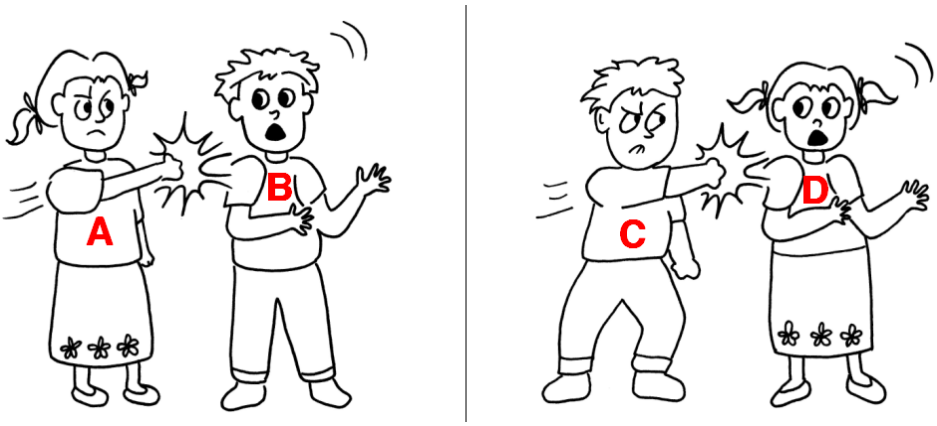
answer without true knowledge of RCs and still appear to perform well. For example, it may appear that a learner has correctly identified the head of an English subject RC when in fact he or she has misunderstood the subject RC as a declarative statement and picked out the first noun (i.e., the first noun strategy as described in O'Grady et al., 2003). An elicited production task also has limitations in that potential ambiguity and subjective judgement of data coding remains in the coding procedure. Possibility of participants' avoidance or paraphrases should be also carefully accounted for during data analysis. Accordingly, the different experimental methodologies with their own limitations possibly result in such conflicting data, as addressed in Chapter 3.

To avoid an unnecessary narrow-scope of research resuling from focusing on a sole experimental methodology and to reconsider the effect of the NPAH on the acquisition of Korean relative clauses through diverse methods, a multitask experimental design is required, preferably a mixed design which includes both comprehension and production tasks. Participants' implicit knowledge and instant cognitive processing can be measured by comprehension tasks, and production tasks can overcome the limitations of the comprehension tasks by enabling researchers to observe the participants' spontaneous explicit responses more transparently. For example, error patterns observed in production data can provide SLA researchers with richer information for the evaluation of interlanguage grammars in more controlled conditions. This should be followed by comparing data from different tasks to identify any resulting interpretations which are biased due to the methodological issues before deciding eventually whether the NPAH works in Korean relativization.

4.3 Method: integrated multitask design

To meet the demand for integrated multitask design as addressed in Section 4.2, I conducted two experiments using a mixed design of processing and production tasks: Listening Comprehension Tasks (LCT) and Picture Description Tasks (PDT). The first and main experiment is the Listening Comprehension Tasks and it was immediately followed by the elicited oral Picture Description Tasks.

I designed these multitask experiments in an attempt to investigate participants' performance in dimensions of both processing and production simultaneously. It was thus intended to systematically interrelate the experimental stimuli in the comprehension and production tasks. For this reason, questions in the Listening Comprehension Tasks (LCT) and the Picture Description Tasks (PDT) were set to correlate to each other: thirty pairs of pictures were adopted for both tasks to present the same stimuli RCs with a same head noun but the target RCs in the two experiments are reversed. An example of the pair of pictures used in the LCT and the PDT is as follows:



Picture 4.1. An example pair of pictures in LCT and PDT

In the Listening Comprehension Tasks, the experiment participants were asked to listen to a Korean relative clause 'Namcaka ttaylinun yeca (the woman who the man is beating)' and expected to choose the girl D which matches to the relative clause they heard. Reversely, its corresponding question in the Picture Description Tasks was designed to direct the participants to describe the girl A's action in the noun-modifying form, 'Namcalul ttaylinun yeca (the woman who is beating the man)', with the same head noun adopted in the correlated RC in the Listening Comprehension Tasks. Details on the procedures of the LCT and PDT will be provided in Section 4.3.3 and Section 5.2.2 respectively.

Another purpose of developing these integrated multitasks is to examine the possibility of participants' choosing a correct answer randomly from any given 4-option multiple choice question in the Listening Comprehension Tasks. In other words, if a participant chooses the right answer of a certain question in LCT but cannot correctly produce its corresponding relative clause with the same head noun in the PDT or the other way around, this should not be considered a performance completely representative of the participant's implicit knowledge of relativization in Korean. In such cases, the measured reaction time and accuracy of the answer in the LCT were regarded as invalid and finally excluded from the statistical analysis of data. If a participant did either not respond to a certain question in the LCT and just skipped it, or produced a completely ungrammatical or violating relative clause against the target RC requirement of the question in the PDT, then both the measured reaction time in the LCT and the recorded answer in the PDT of the pertinent question items were also excluded from data analysis.

As for test items, relative clauses in Korean can be formed on the first four slots in the Accessibility Hierarchy (AH) as explained in Chapter 3, which are subject (SU),

direct object (DO), indirect object (IO) and oblique (OBL) relativization. In addition to the four RC types of grammatical functions, SU- and DO-headed relative clauses can be manipulated to investigate the effect of animacy on SU and DO asymmetry and divided into four RC types with the animacy variable. The multitask experiments in this thesis therefore focus on six RC types in total: relative clauses with an animate SU head noun, an inanimate SU head noun, an animate DO head noun, an inanimate DO head noun, an IO head noun, and an OBL head noun.

4.3.1 Participants

The subjects of the experiments were recruited from intermediate-level classes (levels 3-4 out of 6 levels) at a university Korean language programme in Korea, so it could be assumed that they have already been exposed to instruction on Korean noun modifying clauses. According to the evaluation contents of the Test of Proficiency in Korean (TOPIK), which is organized by the National Institute of International Education in Korea, it is standardized that the Korean noun modifying construction and markers are target learning items of level 2 out of 6 levels.[17]

The subjects consist of four groups: a control group of 15 Korean native speakers, a group of 15 English native speakers, a group of 15 Japanese native speakers and a group of 15 Chinese native speakers, who are all learning Korean at university-level. They were paid £8 or ₩10,000, whichever currency they preferred, for participating in the two one-hour experiments.

[17] For more information about the test and its evaluation standard, visit http://www.topik.go.kr/.

4.3.2 Materials

The Listening Comprehension Tasks (LCT) and the Picture Description Tasks (PDT) are built as computer-assisted language tests using SuperLab 4.5., the latest version of stimulus presentation software developed by Cedrus for research in psychology.

The LCT using SuperLab 4.5 is set to display sound and visual stimuli at the same time. The participants were briefly introduced to the structure of the experiment and then checked with regard to their comfort with the sound volume of the headset and with the monitor of the computer used for the experiment. Before starting the actual experiment, they were asked to complete a set of practice questions which helped them become familiar with the computer-assisted methodology. The advantage of using SuperLab 4.5 for the LCT is that the subjects' reaction time and answer to each stimulus are instantly recorded. The details of how the software is used for the experiment and why it was necessary to develop the experiment using the software will be explained further in Section 4.3.3.

As for test items, the LCT consists of 30 task questions in total: 5 animate subject RCs (SU_A), 5 inanimate subject RCs (SU_I), 5 animate direct object RCs (DO_A), 5 inanimate direct object RCs (DO_I), 5 indirect object RCs (IO) and 5 oblique RCs (OBL)[18]. To raise the reliability of the test, the task questions are programmed to appear randomly.

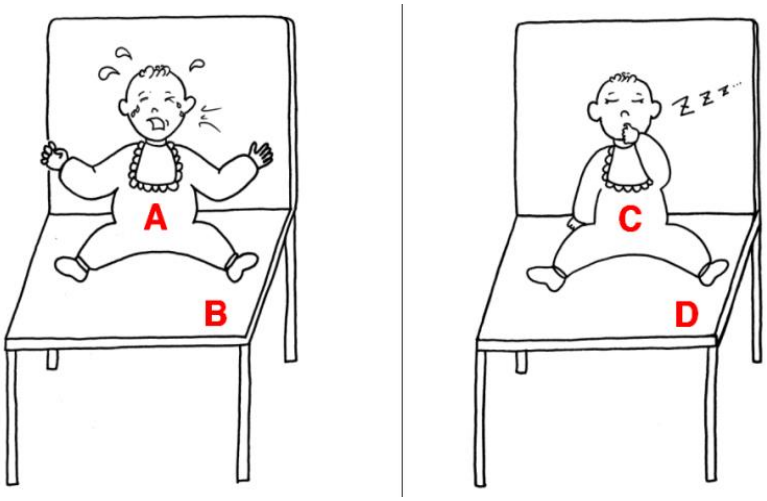
[18] In the case of inanimate SU and OBL RCs, intransitive verbs were used out of necessity due to contextual and experimental limitations. See Section 4.3.3 for more information.

4.3.3 Procedure

Each participant was tested individually in a quiet place by the researcher. Firstly, a pair of pictures, which includes the same object or person as a head noun, appears on the screen of the computer. Right after the pair of pictures has appeared on the screen, a pause of one second is given to the participant to provide time to quickly look though the pictures and letters (see (4.1b)) on them. After one second, the participant hears a recorded task sentence such as (4.1a) and is then expected to choose the right answer, A in this case, among the four options, A, B, C, D, in the corresponding picture (4.1b).

(4.1) a. uyca-eyse wu-nun aki-yeyyo.
chair-Loc cry-Rel baby-SE
'(It is) the baby who is crying on the chair.'

b.



Soon after they click the answer on the answer pad, the message 'Touch the enter

key when you are ready to see the next question' appears on the monitor. When the participants touch the enter key after a pause, they can move to the next task of the LCT.

For the ease of analysis of the data from the LCT, correct answers were coded in advance when the experiment was programmed. Soon after the participant finishes the LCT, the SuperLab Viewer shows the participant's error rate as well as the reaction time for each task. 'Reaction time (RT)' here refers to the time from the end of the recorded audio file to the moment of the participant's input of the answer, no matter whether the answer is correct or not. The reaction time is automatically recorded in milliseconds when a participant presses an answer key. The participant's answers are also recorded and marked automatically as programmed. All the task RCs and pairs of pictures used for the LCT are presented in Appendix A and B, and examples of each RC type used for this experiment are represented as follows:

(4.2) Animate subject relativization (SU_A)

wuyu-lul masi-nun aki

milk-Acc drink-Rel baby

'The baby who drinks milk'

(4.3) Inanimate subject relativization (SU_I)

yek-ey tochakha-nun kicha

station-Loc arrive-Rel train

'The train which arrives in the station'

(4.4) Animate direct object relativization (DO_A)

namca-ka ttayli-nun yeca

man-Nom hit-Rel woman

'The woman whom the man hits'

(4.5) Inanimate direct object relativization (DO_I)

yeca-ka ssu-nun phyenci

woman-Nom write-Rel letter

'The letter which the woman writes'

(4.6) Indirect object relativization (IO)

namca-ka kkoch-ul cwu-nun yeca

man-Nom flower-Acc give-Rel woman

'The woman to whom the man gives the flower'

(4.7) Oblique relativization (OBL)

haksayng-i ca-nun chayksang

student-Nom sleep-Rel desk

'The desk on which the student sleeps'

As shown in the example RCs above, transitive verbs were used for animate SU, animate DO, inanimate DO, and IO RCs in the experiment. As for inanimate SU and OBL RCs, intransitive verbs were used unavoidably due to their contextual and experimental limitations. When inanimate SU RCs are associated with a transitive verb in Korean, they normally take abstract nouns as a subject, which could be an idea, event, quality or concept, as shown in the following example:

(4.8) nay melissok-ul suchi-nun sayngkaktul

my head-Acc flit-Rel thoughts

'The thoughts which flit through my head'

(4.9) sichengcatul-eykey wusum-ul cwu-nun phulokulaym

viewers-Dat laugh-Acc give-Rel Program

'The program which makes the viewers laugh'

Moreover, such RCs cannot be facilitated as a question in the computer-assisted experiment as the inanimate head nouns cannot be visualized and, therefore, they cannot be indicated in picture form on a computer monitor for the computer-assisted experiment. Accordingly, they were replaced by inanimate SU RCs with intransitive verbs.

Similarly, when OBL RCs occur with a transitive verb in Korean, their head nouns are often associated with space or location, which is too wide or large to be visually indicated on-screen in the computer-assisted experiment, as follows:

(4.10) namca-ka yeca-lul manna-nun khephisyop

man-Nom woman-Acc meet-Rel cafe

'The café in which the man meets the woman'

(4.11) yeca-ka theylleypicen-ul po-nun pang

woman-Nom television-Acc watch-Rel room

'The room in which the woman watches the TV'

To avoid causing confusion to the participants by showing a pair of abstract pictures on screen, it was inevitable to use both transitive and intransitive verbs to make some

questions of OBL RCs.

However, the verb type issue is not a crucial factor which affects the purpose of the experiment as the main focus of the research relies on 1) the grammatical function relativized, which is the head noun, and 2) the thematic entity of the head noun, not the type of the verb in the relative clauses. The verb type issue will be discussed further along with the interpretation of the statistical results in Section 4.5.

4.4 Results: Statistical analysis of participants' reaction time

4.4.1 The effects of types of relative clauses and the participants' first language

IBM SPSS (Statistical Package for the Social Sciences) Version 19 was used for analyzing the data and the analysis of reaction time was conducted only on correctly answered items. In the statistical analysis of reaction time of the LCT, three variables are involved: one categorical independent between-subjects variable with four levels (L1: Korean/Japanese/Chinese/English), one categorical independent within-subjects variable with six levels (RC types: animate SU/inanimate SU/animate DO/inanimate DO/IO/OBL relatization), and one continuous dependent variable (the participants' reaction times to the Korean relativization in the Listening Comprehension Tasks). All of the subjects from the four different L1 groups were tested with the 6 different RC types and their reaction time was measured at each of them. Therefore a 'mixed between-within subjects ANOVA (Tabachnick and Fidell, 2001)' was conducted to explore the impact of RC types and L1 on participants' reaction time in the comprehension of Korean relative clauses, as measured by the Listening

Comprehension Test (LCT), and to test whether the interaction between RC types and L1 is significant. The statistical analysis indicates whether there is a change in reaction time over six RC types (the main effect of RC type) and compares the four L1 groups' performance in terms of their accessibility to Korean relative clauses by comparing means of their reaction time to each RC type (the main effect of L1 background). Finally, it shows whether the change in reaction time over RC types is different for the four L1 groups (the interaction effect). The means of reaction times taken for processing six RC types over four L1 are presented in Table 1:

Table 4.1. The means of reaction times taken for processing six RC types over four L1 (milliseconds)

L1	RC types					
	SU_A	SU_I	DO_A	DO_I	IO	OBL
Korean	4623.37	4931.15	4934.60	4602.35	5789.19	4694.81
Japanese	4950.73	5311.43	5191.87	4696.54	5800.26	5116.52
Chinese	5782.56	6828.07	5726.65	5259.58	6468.07	6094.26
English	5414.09	7219.61	5748.31	5667.27	7025.56	5911.29

Maunchly's test indicates that the assumption of sphericity has been violated for the main effect of the type of relative clauses ($\chi^2(14) = 39.80$, $p < .001$). Therefore degrees of freedom were corrected using Greenhouse-Gaisser estimates of sphericity ($\varepsilon = .72$).

All the effects were reported as significant at $p < .05$. There was a significant main effect of RC type on participants' reaction time in comprehending relative clauses in Korean, F (3.60, 201.78) = 22.35, $p < .001$. However, contrasts revealed that the reaction time for processing relative clauses with an inanimate direct object head was not significantly different from the reaction time taken for processing relative clauses with an animate subject head, F (1, 56) = 1.26, $p = .27$. Similarly, the

reaction time taken for processing relative clauses with an animate subject head was not significantly different from the reaction time taken for an animate direct object head, F (1, 56) = 3.05, p = .09. In other words, animate subject RCs and both animate and inanimate direct object RCs were equally accessible. This result violates the principle of the Noun Phrase Accessibility Hierarchy (NPAH), by implying that there is not a strict hierarchy of these grammatical functions in terms of accessibility.

There was also a significant main effect of the participants' first language on their reaction time in comprehending relative clauses in Korean, F (3, 56) = 7.98, p < .001. The reaction time taken for processing relative clauses was significantly different as related to a different first language background, as shown in Figure 4.1:

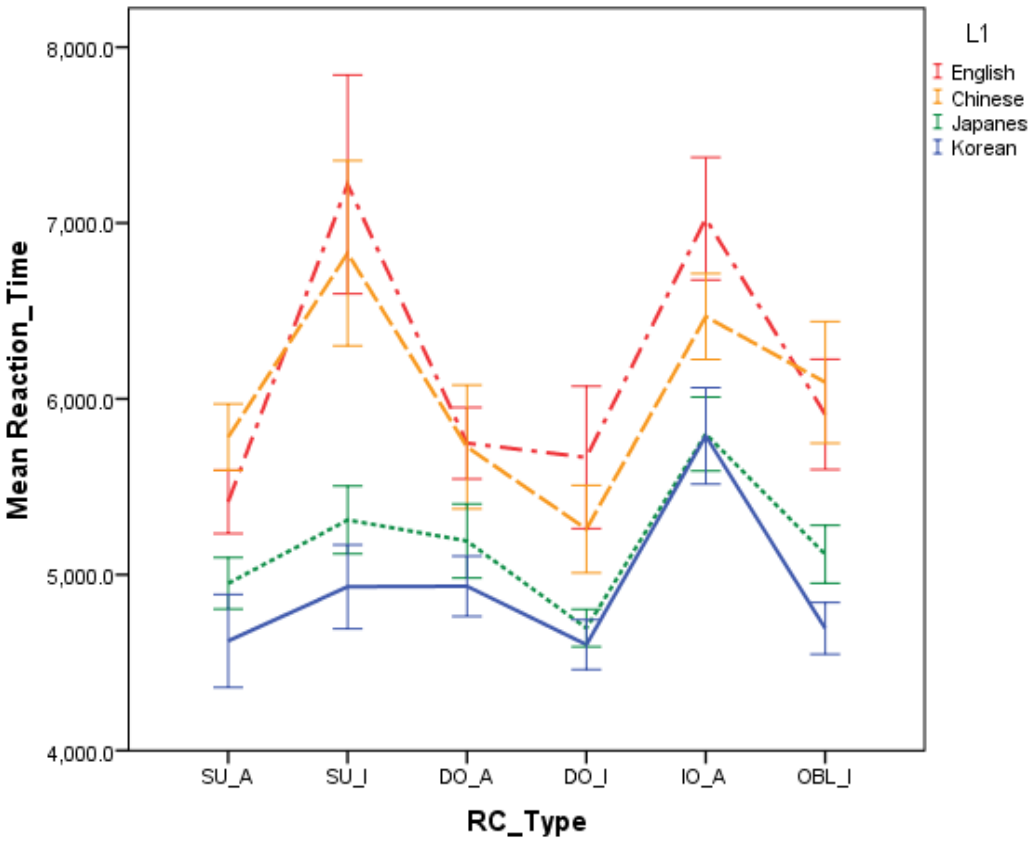


Figure 4.1. Mean reaction time of L1 groups across RC types. Error bars indicate one standard error.

As shown in Figure 4.1, Korean native speakers showed the shortest reaction times across the 6 types of relative clauses. The Estimated Marginal Means confirmed that Korean native speakers' fastest reaction time was followed by Japanese and Chinese speakers, and then English native speakers. Korean native speakers and Japanese learners of Korean showed similar higher performance, and both Chinese speakers and English speakers showed relatively lower performance on processing the relative clauses. In addition, the Pairwise Comparisons revealed that the mean of reaction time taken for processing was not significantly different between Korean and Japanese (mean difference = -248.65 s; 95% CI = -863.02, 365.72; p = .42), and between Chinese and English (mean difference = -137.83 s; 95% CI = -752.19, 476.54; p = .66). The similarity between the two groups indicates that there was L1 transfer due to structural similarities of the pairs of languages. The results of the two main effects therefore show that the participants' reaction time to the Korean relative clauses was significantly affected by the type of the relative clauses and the participants' first language background.

There was a significant interaction effect between the types of relative clauses and the participants' first language, F (10.81, 201.78) = 2.19, $p < .05$. This indicates that the accessibility of different types of relative clauses differed in participants from different L1 backgrounds. To break down this interaction, contrasts were performed comparing each level of accessibility to the relative clauses with an animate subject head, which is supposed to be the most accessible in every language according to the NPAH, across the four different first language backgrounds. These revealed significant interactions when comparing the four different L1 groups' reaction time to relative clauses with an animate subject head to relative clauses with an inanimate subject head, $F(3, 56) = 3.8$, $p < .05$. However, the estimated reaction times for

processing the four other relative clauses were not significantly different from relative clauses with an animate subject head in Korean. In other words, the reaction time taken for processing relative clauses with an animate subject head was not significantly different from relative clauses with an animate direct object head, an inanimate direct object head, an indirect object head and an oblique head, regarding the effect of the participants' first language backgrounds. These results offer additional support to the idea that there is not just a simple hierarchy of these grammatical functions in Korean relative clauses in terms of accessibility.

Next, post-hoc tests revealed that the reaction time taken for Korean native speakers to comprehend the relative clauses was significantly shorter than Chinese speakers (mean difference = -1097.29 s; 95% CI = -1957.64, -236.94; $p < .05$) and English speakers (mean difference = -1235.11 s; 95% CI = -2131.65, -338.58; $p < .05$). The reaction time taken for Japanese speakers was also significantly shorter than Chinese speakers (mean difference = -848.64 s; 95% CI = -1653.74, -43.54; $p < .05$) and English speakers (mean difference = -986.47 s; 95% CI = -1831.22, -141.72; $p < .05$). Again, it can be concluded that the Korean native speakers and Japanese learners of Korean showed similar higher performance, and both Chinese speakers and English speakers showed relatively lower performance on processing the relative clauses. This result indicates the possibility of L1 transfer due to the structural similarity of Korean and Japanese noun modifying clauses. The influence of the structural similarity of the two languages on RC processing will be discussed further in Section 4.5.

In summary, the orders of accessibility over the four L1 groups in terms of reaction time to each RC type are displayed in the following table:

Table 4.2. The orders of accessibility over the four L1 groups in terms of reaction time

	most accessible ◄——► least accessible least marked ——► most marked					
Korean	DO_I	SU_A	OBL	SU_I	DO_A	IO
Japanese	DO_I	SU_A	OBL	DO_A	SU_I	IO
Chinese	DO_I	DO_A	SU_A	OBL	IO	SU_I
English	SU_A	DO_I	DO_A	OBL	IO	SU_I

For Korean, Japanese and Chinese, the most accessible RC type was inanimate DO RCs. As for Korean and Japanese, it was followed by animate SU and OBL RCs and IO RCs were least accessible. As for Chinese, both types of DO RCs were followed by animate SU and OBL RCs and inanimate SU RCs were least accessible. For English native speakers, animate SU RCs were most accessible, which was followed by both types of DO RCs, and inanimate SU RCs were least accessible. The similarities and differences of the pattern of the accessibility orders will be discussed further in Section 4.5 along with potential reasons behind them.

4.4.2 The effects of animacy

Along with analyzing the effect of types of relative clauses and the participants' first language backgrounds on their reaction time in comprehending relative clauses in Korean, an additional mixed between-within subjects ANOVA on relative clauses with SU and DO head nouns was conducted to investigate if there is an effect of animacy, as a semantic cue, on processing relative clauses in Korean. In this respect, some recent L2 studies have cited the role of animacy in relativization: Ozeki and Shirai (2007a), based on Comrie's (2002) argument on noun modifying clauses in East Asian languages, emphasized the role of semantic information such as animacy

in the acquisition of East Asian RCs. They examined the production data of L2 learners of Japanese, which illustrated that the subject RCs tended to have more animate heads, whereas the object RCs tended to have inanimate heads. Kanno (2007) also reported that learners understood RCs better when an animacy cue is provided. Jeon and Kim (2007) found that participants tended to make more errors when object RCs were associated with an animate head noun in picture description tasks.

Despite these results, the empirical findings for animacy effect are not robust, with the majority of evidence coming from Japanese and Korean. Support for the animacy effect also seems limited to spontaneous speech data and error analysis. Furthermore, neither Ozeki and Shirai's (2007a) sentence combination task nor Jeon and Kim's (2007) picture description task found a significant animacy effect. As the results from previous L2 studies of East Asian languages are inconclusive with respect to animacy effects, this follow-up analysis was conducted to investigate 1) whether animacy is a potential element which affects L2 Korean language learners' processing of Korean relative clauses and, 2) if so, whether animacy influences SU preference to animate head nouns and DO preference to inanimate head nouns as reported in previous L2 studies[19].

To scrutinize the effect of animacy on processing relative clauses with SU and DO head nouns, the variable of animacy (animate/inanimate head nouns) was initially added to the design of the Listening Comprehension Tasks by expanding SU and DO RCs to four separate RC types with the animacy variable: relative clauses with animate SU head nouns/inanimate SU head nouns/animate DO head nouns/inanimate DO head nouns. If it turns out that there is a main effect of animacy on processing Korean relative clauses, the follow-up research question is then whether the effect of

[19] See Section 3.4.4 for more information.

animacy is more significant than the effects of the other two variables, RC types and L1 backgrounds, in processing relative clauses in Korean. Accordingly, in this additional statistical analysis, one categorical independent between-subjects variable is L1 (Korean/Japanese/Chinese/English), and two categorical independent within-subjects variables with two levels are RC types (SU/DO relative clauses) and animacy (animate/inanimate head nouns).

All the effects were reported as significant at $p < .05$, and only significant main effects relevant to the research questions will be reported when it is necessary. There was a significant main effect of animacy on the participants' reaction time in comprehending SU and DO relative clauses in Korean, F (1, 56) = 5.99, $p < .05$. This indicates that the reaction time taken for processing SU and DO relative clauses was significantly influenced by animacy of the head noun. The effect of RC types on the participants' reaction time was also statistically significant, F (1, 56) = 14.34, $p < .001$, even when the RC types were limited to relative clauses with SU and DO head nouns. There was also a significant main effect of the participants' L1, F (3, 56) = 7.22, $p < .001$.

As for the interaction effects with respect to animacy, the interaction effect between animacy and L1 was statistically significant, F (3, 56) = 3.78, $p < .05$. There was also a significant interaction effect between animacy and RC types, F (1, 56) = 30.72, $p < .001$. The interaction of RC types and L1 also had a significant effect, F (3, 56) = 3.01, $p < .05$. However, the overall interaction of animacy, RC types, and L1 did not show any significant main effect, F (3, 56) = 1.71, $p = .18$. This indicates that the variable of animacy did not add significant effect to the interaction of RC types and L1. Accordingly, to investigate the relative influences of the three variables - animacy, RC types and L1 - on processing relative clauses in Korean, their effect

sizes were compared. SPSS provides the Partial Eta-squared (η_p^2) as a measure of effect size for use in ANOVA, which shows the contribution of each factor or interaction taken as if it were the only variable. As η_p^2 is the proportion of the sum of the effect and the error variance attributable to the effect, this type of statistics does fit the purpose of comparing the three variables in this case. η_p^2 ranges between 0 and 1, and the effect size between .01 and .06 regarded as small, between .06 and .14 as medium, and beyond .14 as large (Kittler, Menard, & Phillips, 2007). The effect size of animacy, η_p^2 = .10, is almost half of the effect size of RC types, η_p^2 = .20, and L1, η_p^2 = .28 which are considerably large. This represents that, although all of the three factors - animacy, RC types and L1 - had significant effects on processing relative clauses in Korean individually, the factors of RC types and L1 had stronger influence on the processing of Korean RCs than animacy did. The influences of RC types and L1 will be discussed further in Section 4.5.

Next, with regard to the main effect of animacy, Pairwise Comparisons were carried out to investigate whether animacy of the head nouns affects processing the relative clauses with SU and DO head nouns. The RT for animate SU RCs was significantly different from inanimate SU RCs (mean difference = -879.88 s; 95% CI = -1240.92, -518.84; $p < .001$) but not different from the RTs of animate DO RCs (mean difference = -207.66 s; 95% CI = -445.91, 30.58; $p = .09$) and inanimate DO RCs (mean difference = 136.26 s; 95% CI = -107.08, 379.59; $p = .27$). The RT for inanimate SU RCs was significantly different from all other RCs, such as animate SU RCs (mean difference = 879.88 s; 95% CI = 518.84, 1240.92; $p < .001$), animate DO RCs (mean difference = 672.21 s; 95% CI = 333.69, 1030.74; $p < .001$) and inanimate DO RCs (mean difference = 1016.13 s; 95% CI = 652.12, 1380.15; $p < .001$). The RT for animate DO RCs was significantly different from inanimate SU

RCs (mean difference = -672.21 s; 95% CI = -1030.74, -313.69; $p < .001$) and inanimate DO RCs (mean difference = 343.92 s; 95% CI = -91.39, 596.45; $p < .05$) but not different from the RTs for animate SU RCs (mean difference = 207.66 s; 95% CI = -30.58, 445.91; $p = .09$). The RT for inanimate DO RCs was significantly different from inanimate SU RCs (mean difference = -1016.13 s; 95% CI = -1380.15, -652.12; $p < .001$) and animate DO RCs (mean difference = -343.92 s; 95% CI = -596.45, -91.40; $p < .05$) but not different from the RT for animate SU RCs (mean difference = -136.26 s; 95% CI = -379.59, 107.08; $p = .27$). From the comparisons, the RTs for animate SU RCs and inanimate DO RCs are not significantly different as shown in Figure 4.2, which indicates that the accessibility to these two RC types is similarly high in terms of processing:

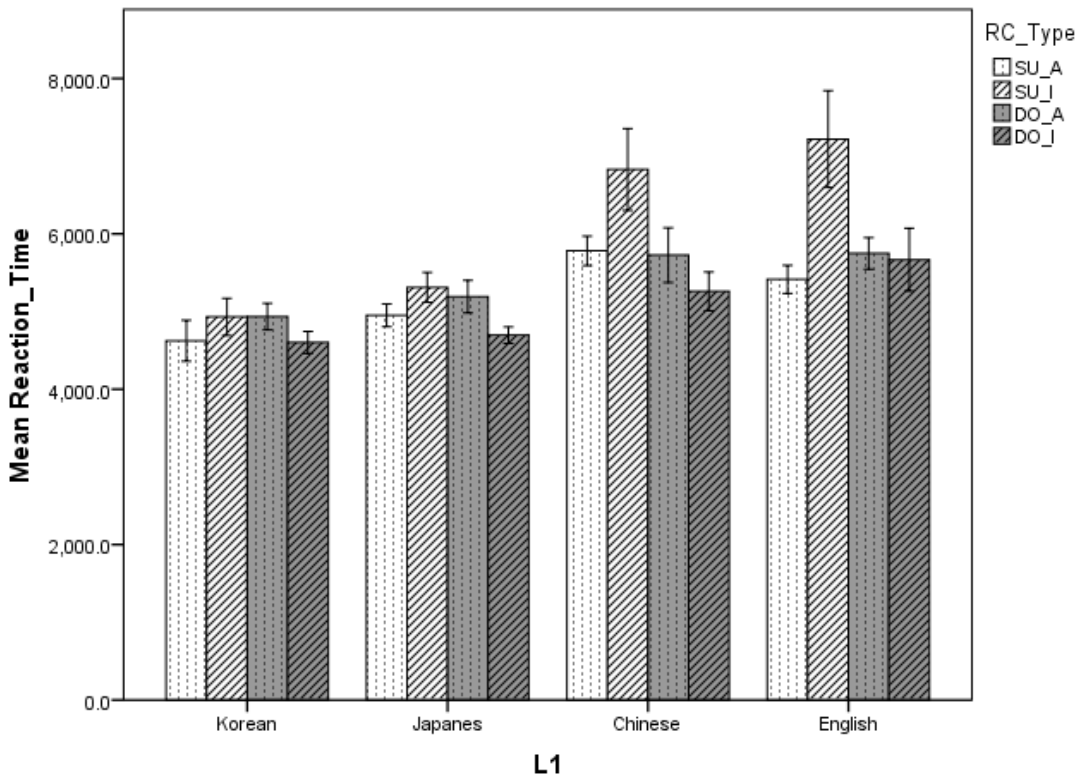


Figure 4.2. Means of SU and DO relative clauses with animacy with one standard error

Next, to test whether the similar processing accessibility of animate SU RCs and inanimate DO RCs are universal across different L1 backgrounds, separate dependent *t*-tests on animate SU RCs and inanimate DO RCs were conducted for each L1 background by comparing their mean RT taken for processing animate SU and inanimate DO RCs.

All effects will be reported at a .05 level of significance. As for Korean, the reaction time for comprehending animate SU RCs (M = 4623.37, SE = 263.93) was not significantly higher than the RT for inanimate DO RCs (M = 4602.35, SE = 142.20), t (14) = .13, p = .90, r = .85. As for Japanese, the reaction time for comprehending animate SU RCs (M = 4950.73, SE = 146.71) was not also significantly higher than the RT for inanimate DO RCs (M = 4696.54, SE = 106.50), t (14) = 1.62, p = .13, r = .26. Similarly, for Chinese, the reaction time for comprehending animate SU RCs (M = 5782.56, SE = 189.15) was not also significantly higher than the RT for inanimate DO RCs (M = 5259.58, SE = 249.30), t (14) = 2.09, p = .06, r = .37. As for English, the pattern was slightly different from other L1 backgrounds. For English speakers, the reaction time for comprehending inanimate DO RCs (M = 5667.27, SE = 404.95) was higher than the RT for animate SU RCs (M = 5414.09, SE = 179.87). However the difference was not significant, t (14) = -.72, p = .48, r = .51. In sum, for Korean, Japanese, and Chinese, the RTs for processing inaiminate DO RCs were shorter than the RTs for animate SU RCs in contrast to English speakers, who processed animate SU RCs faster than inanimate DO RCs. However, the RT differences of the animate SU and inanimate DO RCs were not statically significant enough overall, which indicates that accessibility to animate SU RCs and inanimate DO RCs were similar over the participants from four different L1 backgrounds.

In literature on the effect of animacy on formation of relative clauses, the match of thematic fit and the entity in relative clauses has recently been largely fuelled by a discussion on accessibility of relative clauses. The animacy effect appeared in the results of the Listening Comprehension Tasks will be discussed in detail in Section 4.5.1.1 with regard to the lexico-semantic information.

4.5 Discussion

Findings with regard to processing of RCs in L2 Korean and the multiple factors affecting the processing results which are inconsistent with NPAH are discussed in this section, together with relevant issues addressed in Chapter 3. The possible factors for the accessibility gap of relativized grammatical functions between the prediction of NPAH and the actual processing of RCs in L2 Korean which were found in the present experiment are: 1) types of relative clauses, 2) L2 Korean speakers' first language, and 3) animacy of the head noun. However, the results suggest that the three factors do have relatively different effects on RC processing in Korean. Findings from statistical analysis of reaction time regarding RC types, L1, and animacy are summarised in this section and the influence of the multiple factors and their inter-relationship will be discussed with details in the following subsections.

The overall results of the Listening Comprehension Tasks (LCT) show that the NPAH effect was not found in processing relative clauses in Korean. The most interesting outcome of the LCT is that multiple factors are involved in the processing, such as RC types, L1 and animacy. The results of statistical analysis showed that there are significant main effects of RC types, L1, and animacy on processing relative clauses in Korean. However, the effect sizes of the three elements are

different; in particular, the effect of animacy was relatively smaller than the effects of RC types and L1. The results of Experiment 1 suggest that there is no strict Accessibility Hierarchy of relativized grammatical functions in RC processing in Korean, which is inconsistent with Keenan and Comrie (1977).

Firstly, the reaction time for processing each RC type showed that there was a significant effect of RC types on processing Korean relative clauses. Although the reaction time for processing each RC type in Korean was different, the differences were, however, not significant enough to confirm that the NPAH operates in processing relative clauses in L1 and L2 Korean. That is, although accessibility to each RC type in L1 and L2 Korean is different, the hierarchy of the accessibility does not function in the same way as the NPAH effect. Particularly, both types of direct object RCs and animate subject RCs were almost equally accessible, which violates the principle of NPAH, by implying that there is not a strict Accessibility Hierarchy of these grammatical functions at least in processing of RCs in Korean.

Secondly, the main effect of L1 was also significant on processing Korean relative clauses. The highest performance of Korean native speakers was followed by Japanese, Chinese, and English speaking L2 learners of Korean language. However, processing performance between Korean and Japanese and between Chinese and English was not significantly different. The results suggest that previous syntactic accounts for processing RCs, such as the Linear Distance Hypothesis (LDH) and the Structural Distance Hypothesis (SDH), should be reconsidered regarding the basic word order and structural similarities of these two pairs of languages which might have caused L1 transfer in processing Korean RCs.

Thirdly, the effect of animacy is also statistically significant although the effect size of animacy is relatively smaller than RC type and L1. As noted in previous

studies of the role of animacy in relativization, there was no significant difference in processing animate SU RCs and inanimate DO RCs over the four different L1 backgrounds in the Listening Comprehension Tasks. For Korean, Japanese and Chinese, inanimate DO RCs took the shortest processing time whereas it was animate SU RCs for English speakers.

4.5.1 The effect of animacy as semantic information

The results of statistical analysis showed that animacy has a significant effect on processing RCs in Korean along with RC types and L1. The mean of RTs of animate SU RCs is significantly different from inanimate SU RCs and, similarly, the mean of RTs of inanimate DO RCs is significantly different from animate DO RCs. The additional analysis confirmed that RTs of animate SU and inanimate DO RCs are not significantly different over the four L1s. The results indicate that animate SU and inanimate DO RCs are similarly more accessible to relativization and preferred over inanimate SU and animate DO RCs in terms of processing RCs in L1 and L2 Korean.

The empirical findings of the current research with respect to a role of animacy in processing Korean RCs are worth noting. Following Comrie's (2002) noun-modifying clause analysis as pointed in Section 3.3.1, some recent L2 studies have emphasized the role of semantic information such as animacy in the acquisition of East Asian RCs. Ozeki and Shirai (2007a) examined the production data of L2 learners of Japanese, which illustrated that the subject RCs tended to have more animate heads, whereas the object RCs tended to have inanimate heads. Kanno (2007) also reported that learners understood RCs better when an animacy cue was provided (i.e., semantically irreversible RCs), and Jeon and Kim (2007) found that participants

tended to make more errors when object RCs were associated with an animate head noun in picture description tasks.

Despite these results, the empirical findings for an animacy effect have not been robust. Support for this effect also seems limited to spontaneous speech data and error analysis. Furthermore, neither Ozeki and Shirai's (2007a) sentence combination task nor Jeon and Kim's (2007) picture description task found a significant animacy effect. The results from previous L2 studies of East Asian languages were thus inconclusive with respect to the animacy effect.

The current study shows that the animacy of the head noun does influence the processing difficulty of relative clauses in Korean and, therefore, it seem plausible that L2 Korean learners as well as L1 Korean speakers use a salient semantic cue like animacy in the processing, which is consistent with Kanno (2007), Ozeki and Shirai (2007a), and Jeon and Kim (2007). These results can only be accounted for by current major theories of relative clause processing when additional assumptions are introduced, and, at the same time, show that the possibility of semantically-driven analysis can be considered as a serious alternative.

However, for such confirmation, caution should be exercised beforehand when the animacy effect is examined: animacy of the entities in the relative clause construction must be under the same experimental conditions along with manipulation of animacy of the head noun to prevent its influence on the participants' choice between a subject or object relative clause. In this respect, the similar accessibility of animate SU and inanimate DO RCs in this experiment should be reanalyzed. In both types of RCs involved in this experiment, subjects are animate and objects are inanimate, which means, in animate SU RCs, the head noun is animate and the NP in the relative clause is inanimate whereas, in inanimate DO RCs,

the head noun is inanimate and the NP in the relative clause is animate. That is, when the animacy of head nouns is only manipulated and all thematic entities of relative clauses are under the same animacy condition, the difference in processing difficulty between the subject and object relative clauses disappears and the semantic manipulation of animacy of head nouns clearly does affect processing of Korean RCs. The animacy effect of the present experiment therefore gains stronger ground by implying that the similar accessibility of the two RC types purely resulted from the animacy of head nouns other than their RC types.

On the basis of this result, one must seriously explore the possibility that the semantic cue of animacy immediately guides the choice for an analysis of the relative clause. This animacy effect appearing in the present study could be interpreted in two ways regarding the prenominal and head-final features of Korean RCs. First, if participants choose an analysis of the relative clause immediately when they hear the first NP, the animacy of the first NP may determine the preferred analysis of the relative clause. When the first NP the participants hear is inanimate, participants may choose the subject relative clause processing, but when the first NP they hear is animate, then they may choose the object relative clause processing. If so, no processing difficulty would be expected in object relative clauses with an animate subject, since the first NP is animate in these cases. However, that is not the case because animate DO RCs in the present study also has an animate subject but showed lower accessibility than animate SU and inanimate DO RCs over different L1 groups. Second, one could assume that readers do not choose between subject and object relative clause processing when they hear the first NP in the relative clause, but only when they process the head noun which follows the relative clause. Then, at that position, participants are faced with two entities that compete for the

role of subject and object of the relative clause. One of the sources of information that participants can use to resolve this competition is the animacy of the head nouns, as controlled in the present study. If the head nouns differ in animacy, the participant chooses the animate head noun as the subject of the relative clause. This account predicts that there will be no difference in accessibility between subject relative clauses and object relative clauses in the cases in which the subject is animate and the object is inanimate, which is consistent with the results of the present study.

Consequently, the results of my experiment represent that the semantic factor of animacy of the head noun of relative clauses affects the analysis of relative clauses. The data clearly show the possibility that readers use semantic information to guide their parsing of a relative clause. However, the effect size of RC type and L1 was greater than animacy, implying that the semantic information was not enough to override the preference for object relative clauses. The processing advantage of objects is discussed below by investigating relation of filler-gap dependencies and the ease of processing of objects.

4.5.2 Linear distance in pre-nominal relative clause processing complexity

As discussed in the previous section, over the four languages, the RT for animate SU is shorter than inanimate SU RCs and the RT for inanimate DO is shorter than animate DO RCs. The overall effect of animacy on the parsing of relative clauses is presented in Figure 4.3:

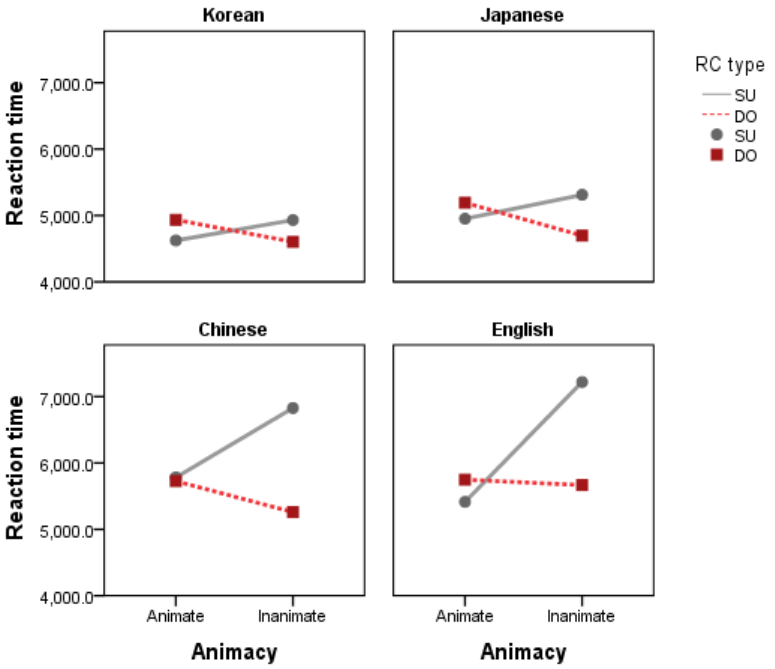


Figure 4.3. Animacy effect on SU and DO RC processing over four L1 groups with one standard error

However, as proven by the statistical analysis in Section 4.4, the effect of animacy is relatively small and the effect size of animacy is almost half of RC types and L1, implying syntactic primacy over semantic primacy in processing RCs in Korean. In other words, syntactic construction of relative clauses and the word order of the learner's first language are presumably more influential than semantic information on processing RCs in Korean.

In addition to the animacy effect over the four language groups, another significant feature appearing in Figure 4.3 is the remarkably similar pattern of line graphs of Korean and Japanese groups, and Chinese and English groups, as also proven by statistical analysis (see Section 4.4.1). The similar line patterns of the two pairs of languages represent that the structural similarities of the two pairs of languages and their word order probably enhanced L1 transfer between Korean and Japanese, and Chinese and English. Moreover, it makes the argument of syntactic

primacy over semantic primacy more valid that English speakers comprehend animate SU RCs faster than inanimate DO RCs, which is in contrast to Korean, Japanese and Chinese speakers, for whom animate SU RCs in Korean are harder to process than inanimate DO RCs (see Section 4.4.2).

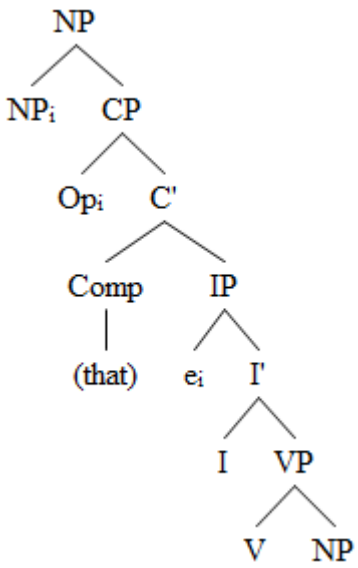
These results are basically incompatible with accounts of the Noun Phrase Accessibility Hierarchy (NPAH, Keenan and Comrie, 1977) because the NPAH hypothesis predicts that subject RCs are easier to process than object RCs regardless of the specifics of linguistic structure. The Accessibility Hierarchy, which is based on the inherent saliency of subjects relative to objects, claims that grammatical functions are universally ordered in a hierarchy that determines the relative accessibility of a given function; since subjects are placed higher than objects in this hierarchy, subject-object asymmetries should always favour subjects with no appeal to syntactic structure.

The answer for the subject-object processing asymmetries reported in the present study therefore can be found in the hypotheses that predict processing differences across languages depending on the parametric features of the grammar in the relation of word order and RC constructions. As explained in Section 3.4.6, a common underlying principle to the structure-dependent explanations is the appeal to the relative *distance* between filler-gap dependencies, with increasing distance correlating with increasing complexity. This notion of distance can be characterized in two different ways: in terms of linear distance – the amount of intervening words/discourse referents – as in the Linear Distance Hypothesis (LDH, Tarallo & Myhill, 1983; R. Hawkins, 1989; Gibson, 1998, 2000), or in terms of structural distance – the amount of intervening syntactic nodes/projections – as in the Structural Distance Hypothesis (SDH, O'Grady, 1997; O'Grady et al., 2003).

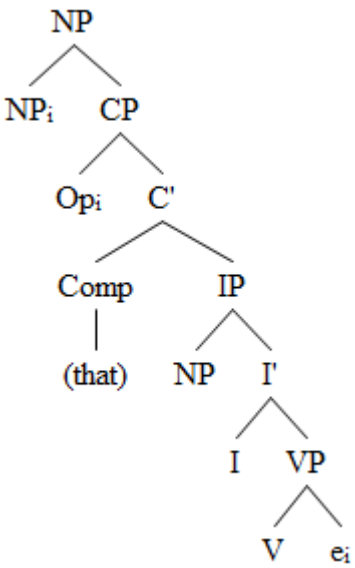
Structural distance between filler and gap is always greater in object RCs (OR) than in subject RCs (SR), because objects are embedded deeper in syntactic structure than subjects. This holds both in head-initial (VO) and in head-final (OV) languages, so that both language groups are predicted to display the same complexity effect by the SDH. Syntactic representations in (4.12) and (4.13) schematically illustrate the different predictions made by SDH and LDH for head-initial and head-final RCs:

(4.12) Post-nominal and head-initial SR and OR (English)

a.

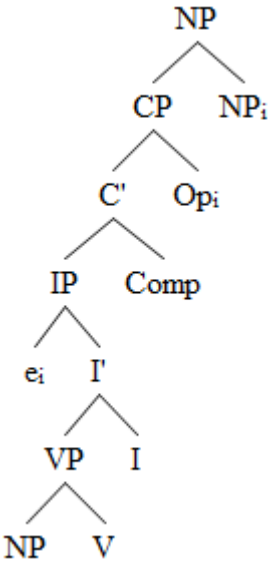


b.

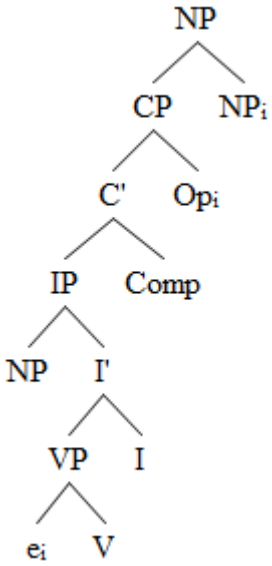


Pre-nominal and head-final SR and OR (Korean and Japanese)

c.

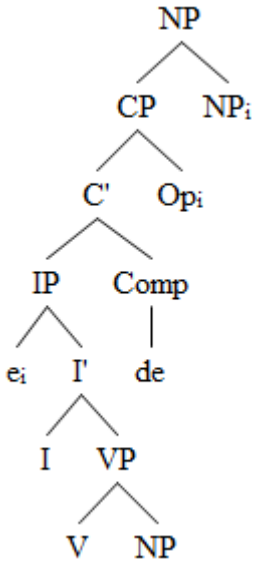


d.

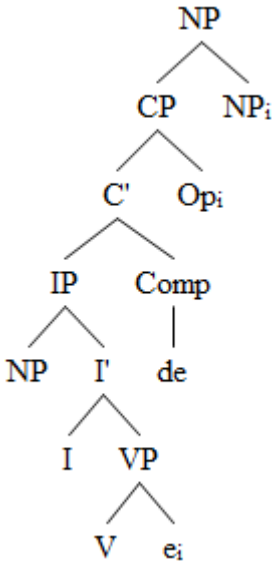


Pre-nominal and head-final SR and OR (Chinese)

e.



f.



Structures (4.12a), (4.12c) and (4.12e) represent a subject RC in English, Korean and Japanese, and Chinese respectively. Structures (4.12b), (4.12d) and (4.12f) illustrate

an object RC in English, Korean and Japanese, and Chinese. As shown in (4.12), the subject-gap is higher than the object gap in both types of grammars, regardless of head-direction, since the object gap is always embedded deeper in the structure, inside the VP.

A complexity metric in terms of linear distance predicts inverse asymmetries depending on the value of the head-parameter: in head-final RCs, such as in Korean, Japanese and Chinese, the linear distance between the gap and the filler of a SR (4.13c) and (4.13e) is greater than the linear distance between the gap and the filler of an OR (4.13d) and (4.13f). However, in head-initial RCs, such as in English, both linear and structural distance between the filler and the gap is greater in OR (4.13b) than in SR (4.13a):

(4.13) Post-nominal and head-initial SR and OR (English)

a. filler$_i$ [$_{RC}$ e$_i$ Verb Object]

b. filler$_i$ [$_{RC}$ Subject Verb e$_i$]

Pre-nominal and head-final SR and OR (Korean and Japanese)

c. [$_{RC}$ e$_i$ Object Verb-rel] filler$_i$

d. [$_{RC}$ Subject e$_i$ Verb-rel] filler$_i$

Pre-nominal and head-final SR and OR (Chinese)

e. [$_{RC}$ e$_i$ Verb Object rel] filler$_i$

f. [$_{RC}$ Subject Verb e$_i$ rel] filler$_i$

Both notions of distance make similar predictions in head-initial languages, so that, in English, the LDH and the SDH generate the same predictions about subject and object relative clauses. However, in head-final languages, each metric yields an

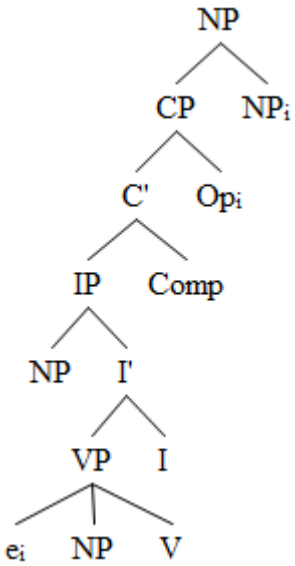
inverse prediction: the linear gap-filler distance is longer in SR than in OR. An account based on structural distance (like the SDH) predicts SR to be simpler and easier to process – subjects are higher in the structure of known natural languages. In contrast, a processing account based on linear distance – intervening material – between filler and gap predicts SR to be easier than OR only in language with post-nominal relative clauses, but OR to be easier than SR in language with pre-nominal relative clauses (e.g., Gibson, 1998, 2000; Hsiao & Gibson, 2003). It is therefore important to clarify what the relative clause processing complexity is in languages with pre-nominal relative clauses to properly adjudicate between these two conceptions of distance.

The results of the present study are incompatible with structural distance, which predicts a SR advantage, but compatible with linear distance because the subject-gap in (4.13c) and (4.13e) is linearly further from its filler than the object-gap in (4.13d) and (4.13f). More importantly, the processing ease of OR in Korean was shown to be the same in Japanese and Chinese speakers' L2 Korean data. The identical results for prenominal SR and OR in the three languages do provide solid evidence for the role of linear distance in the relative clause processing complexity. If so, the prediction made by the Linear Distance Hypothesis exactly coincides with the results of the present study by proving that object relative clauses (OR) are easier to process than subject relatives (SR) in prenominal and head-final languages. Furthermore, the prediction of the LDH is empowered by observing results from testing different languages with different word orders and RC constructions. As predicted by the LDH, participants from a language with prenominal and head-final RCs, such as Korean, Japanese or Chinese, preferred OR over SR. On the other hand, participants from a language with postnominal and head-initial RCs, such as English, showed

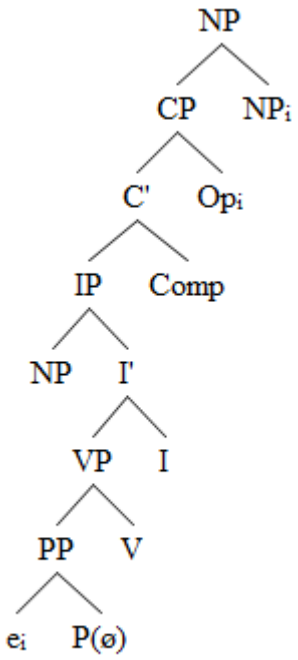
processing preference for SR over OR (See Table 3.3 in Chapter 3).

The prediction of the LDH can be extended to the IO and OBL RCs and explain the prediction for prenominal RCs further in terms of linear distance. Over the four L1 groups in the experiment, OBL RCs were easier to process than IO RCs along with the processing asymmetries of SR and OR. To scrutinize the results, syntactic representations of the Korean IO and OBL RCs used in the present experiment are illustrated below in (4.14):

(4.14) a. IO RC in Korean



b. OBL RC in Korean



As shown in (4.14), the indirect object gap is higher than the oblique gap. Regardless of head-direction, the oblique gap is always embedded deeper in the structure, inside the PP.

In contrast, the linear distance between the gap and the filler of an IO RC (4.15a) is greater than the linear distance between the gap and the filler of an OBL RC (4.15b) as follows:

(4.15) a. [$_{RC}$ Subject e_i Direct Object Verb-rel] filler$_i$

b. [$_{RC}$ Subject e_i Verb-rel] filler$_i$

Therefore, the expanded look at IO and OBL RCs also supports the assertion that linear distance between the gap and the filler is strongly associated with processing RCs in Korean regardless of structural complexity.

To statistically verify the preference for OBL RCs over IO RCs across different L1 backgrounds, additional follow-up mixed between-within subjects ANOVA on relative clauses with IO and OBL head nouns was conducted and ezANOVA was used for the statistical analyses. In this additional statistical analysis, one categorical independent between-subjects variable is L1 (Korean/Japanese/Chinese/English), and one categorical independent within-subjects variables with two levels are RC types (IO/OBL relative clauses). All the effects were reported as significant at $p < .05$. There was a significant main effect of L1, F (3, 56) = 6.70, $p < .001$, and RC type, F (1, 56) = 40.2, $p < .001$, on participants' reaction time in comprehending relative clauses in Korean but no interaction effect of L1 and RC type, F (3, 56) = 1.90, $p = .139$. As shown in Figure 4.4, the reaction time for IO RCs is longer than OBL RCs across the four L1s.

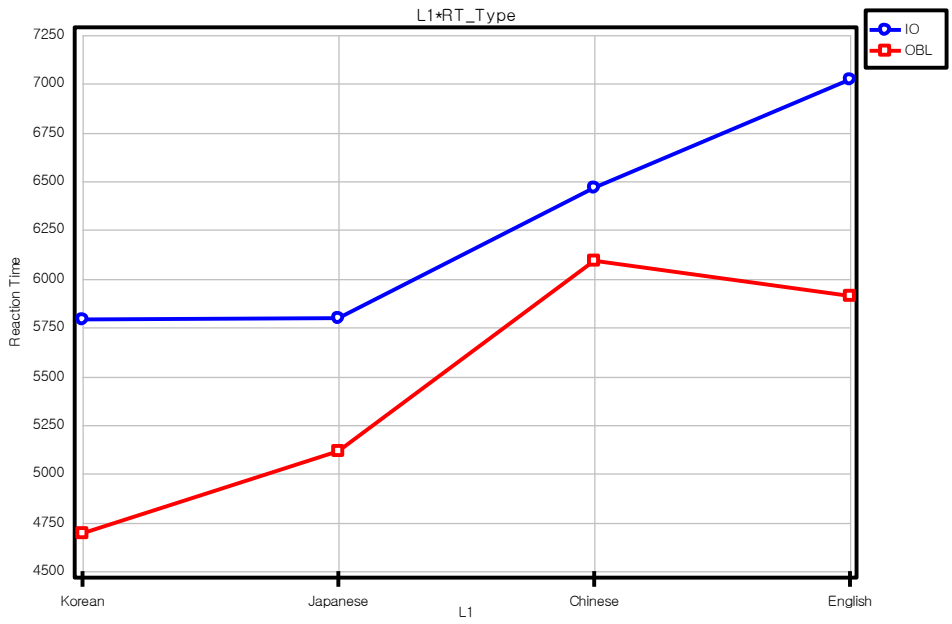


Figure 4.4. Mean reaction time for IO and OBL RC processing across four L1 groups

To test whether the processing asymmetries of IO RCs and OBL RCs are universal

across different L1 backgrounds, separate dependent *t*-tests (Paired t-test in R) on IO RCs and OBL RCs were conducted for each L1 background by comparing their RT means taken for processing IO RCs and OBL RCs.

All effects will be reported at a .05 level of significance. As for Korean, the reaction time for comprehending IO RCs (M = 5789.19, SE = 273.86) was significantly different from the RT for OBL RCs (M = 4694.81, SE = 147.06), t (14) = 4.65, $p < .001$, r = .54. Similarly, for Japanese L1 speakers, the reaction time for comprehending IO RCs (M = 5800.26, SE = 209.82) was also significantly longer than the RT for OBL RCs (M = 5116.52, SE = 164.22), t (14) = 2.79, $p < .0.5$, r = .42. As for Chinese L1 speakers, the reaction time for comprehending IO RCs (M = 6468.07, SE = 244.05) was also longer than the RT for OBL RCs (M = 6094.26, SE = 345.94). However the difference was not significant, t (14) = 1.69, p = .11, r = .16. For English L1 speakers, the reaction time for comprehending IO RCs (M = 7025.56, SE = 348.46) was significantly longer than the RT for OBL RCs (M = 5911.29, SE = 313.66), (14) = 3.50, $p < .05$, r = .40. In sum, for all of the four L1s tested in the current experiment, it is fair to say that the RTs for processing IO RCs were longer than the RTs for OBL RCs and the difference of the RTs between IO and OBL RCs was significant except for Chinese speakers. The RT differences of the IO and OBL RCs indicate that accessibility to OBL RCs was greater than IO RCs, which is also inconsistent with the NPAH effect. Regarding the filler-gap dependencies, as a result, the statistical outcome of the RTs of IO and OBL RCs is equivalent to the analysis based on the LDH.

4.5.3 Pragmatic influence of natural utterance

Finally, the significantly similar line patterns of Korean and Japanese groups indicate that the two languages may reflect pragmatic phenomena beyond both syntactic and semantic accounts regarding linguistic phenomena in Korean and Japanese. In addition to the effect of animacy as a semantic cue in processing RCs, inanimate subjects are pragmatically avoided in Korean and Japanese, thus rendering such constructions infrequent and unnatural-sounding to native speakers. According to Sohn (1999), in these languages, it is often unnatural to produce sentences with inanimate subjects such as *The weather makes me happy*; instead, such sentences are expressed as *I am happy because of the weather*, with an animate subject. Assuming that Japanese speakers learning Korean as well as Korean native speakers are sensitive to these distributional facts of preference with regard to animacy and subject position, it would be natural to find that they process inanimate SU RCs slower when they are exposed to verbal data in Korean. In other words, the correlation between animate head nouns and SU RCs in L1 Korean and L2 Japanese data of the present study, as shown in Figure 4.3, may be a reflection of the distributional characteristics of Korean and Japanese utterances. In short, pragmatic constraints on the use of inanimate subjects in languages like Korean and Japanese should be considered along with syntactic and semantic account when interpreting verbal data of production and processing as in Figure 4.3.

4.5.4 Unsolved questions and limitations of the present study

Findings aside, the current study is not without limitations. First, there were only 60

participants, 15 in each L1 group, in the current experiment. So a larger scale study with more participants should be conducted to confirm the tentative conclusions presented here. Second, it is possible that some of the current findings are specific to the L1 groups tested in the present research even though the factors examined in the current study were assumed to be equally effective in examining L2 speakers of Korean besides Japanese, Chinese and English speakers. Therefore, future studies should compare more groups with different L1 backgrounds. Finally, more experimental tasks should be included in the experimental design to determine whether a task effect indeed exists and, if so, minimize methodological issues despite the advantages that the tasks used in the current study seem to convey.

4.6 Summary

In L2 processing and SLA, various additional factors may influence a learners' developing language, including L1 transfer, (e.g., Kanno, 2007), word-order isomorphism (e.g., Yip & Matthews, 2007), and animacy (e.g., Ozeki & Shirai, 2007a). These other factors may sometimes override the effect of language universals in the measures of language acquisition and processing. Therefore, as J. Hawkins (2007) stated, these multiple factors should be considered to work together in language acquisition and processing. The current experiment provides support for such a multi-factor approach to RC processing with evidence in support of both learning strategies and language universals.

The typological assumption regarding relative clauses, the Noun Phrase Accessibility Hierarchy (NPAH), was tested to reconsider its cross-linguistic applicability to Korean as a foreign language. Computer-assisted Listening

Comprehension Tasks were conducted to measure four different first language groups' reaction time in processing six types of relative clauses in Korean. Data analysis revealed that there were statistically significant main effects of types of relative clauses, participants' first language background, and their interaction on the participants' reaction time in comprehending the relative clauses. In other words, the accessibility of different types of relative clauses differed in participants from different L1 backgrounds. However, the reaction times taken for processing relative clauses with an inanimate direct object head noun, an animate subject head noun, and an animate direct object head noun were not significantly different from each other overall. As for the L1 effect, Korean native speakers' fastest reaction time was followed by Japanese and Chinese speakers, and then English speakers. Additionally, strong similarities of performance between Korean and Japanese, and between Chinese and English, were also found.

Finally, the results of my experiment show that the semantic factor of animacy of the head noun of relative clauses affects the analysis of relative clauses. The data clearly show the possibility that readers use semantic information to guide parsing of relative clauses but at the same time, the semantic information was not enough to override the preference for object relative clauses. The effect of multiple factors will be further explored in a production experiment reported in Chapter 5.

CHAPTER 5

Experiment 2: Picture Description Tasks

5.1 Introduction

In Experiment 1, Korean L1 and L2 speakers' processing of Korean relative clauses was affected by multiple factors: types of relative clauses, participants' first language background, and animacy of the head noun of relative clauses. Participants were insensitive to the Noun Phrase Accessibility Hierarchy (NPAH, henceforth) of relative clauses when the target language is Korean as L1 and L2, and their performance with subject relative clauses which had an animate head noun was not significantly different from that with direct object relative clauses which had an inanimate head noun. The factors determining processing complexity over the NPAH effect in Korean seem to be associated with the linear distance between a filler and a gap in the relative clause construction of Korean (see Section 4.5.2) presented in the experimental stimuli.

In this chapter, the analyses of oral production data collected from the same participants are presented. The central question was whether the participants' processing performance with different RC types shown in the Listening Comprehension Tasks for Experiment 1 could be generalized to their production performance with the same RC constructions. Therefore, the materials in Experiment 2 included the same six types of RC constructions as well as the same head nouns,

which were designed to keep experimental consistency with the materials used in Experiment 1.

Details on experimental materials, experimental procedure and data coding are presented in Section 5.2. Although the experimental materials were constructed to achieve control over the RC types, participants' answers varied more than expected for standardized coding. The detailed criteria for coding participants' responses are thus discussed separately in Section 5.2.3. The statistical analysis and results regarding participants' performance for producing syntactically identical RC types to the ones in Experiment 1 are reported in Section 5.3, followed by Discussion in Section 5.4. In the Discussion, factors affecting participants' production of Korean relative clauses are addressed in relation to these results. A summary of Experiment 2 can be found in Section 5.5.

5.2 Method: elicited oral picture description tasks

5.2.1 Materials

As in Experiment 1, Listening Comprehension Tasks (LCT), Experiment 2, Picture Description Tasks (PDT), was also built as a computer-assisted language test using SuperLab 4.5., the stimulus presentation software developed by Cedrus for research in psychology. The computer-assisted PDT was developed as a form of elicited oral picture description test: it was set to display visual stimuli, which include computerised pictures, and designed to elicit specific RC types.

As explained in Section 4.3, the LCT and PDT were set to correlate to each other: the experimental materials consisted of same thirty pairs of pictures to present the

same stimuli RCs with the same head nouns, but the target RCs in the two experiments were reversed. The target RCs are classified into 6 types depending on the grammatical function of the head noun in the relative clause: 5 animate subject RCs (SU_A), 5 inanimate subject RCs (SU_I), 5 animate direct object RCs (DO_A), 5 inanimate direct object RCs (DO_I), 5 indirect object RCs (IO) and 5 oblique RCs (OBL). To raise the reliability of the test, the task questions in the PDT are programmed to appear randomly as in the LCT.

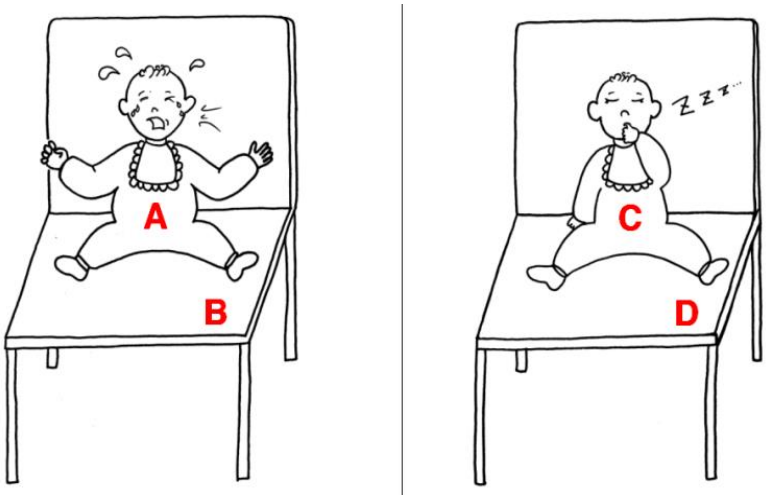
5.2.2 Procedure

The PDT using SuperLab was started soon after the LCT was completed and the same subjects from the LCT participated in the PDT. Again, they were recruited from intermediate-level classes (levels 3-4 out of 6 levels) at a university Korean language programme in Korea, so it could be assumed that they have already been exposed to instruction on Korean noun modifying clauses. The subjects consist of four groups: a control group of 15 Korean native speakers, a group of 15 English native speakers, a group of 15 Japanese native speakers and a group of 15 Chinese native speakers, who are all learning Korean at university-level. Before starting the PDT, the participants were checked with regard to their comfort with the monitor of the computer used for the experiment again, and then asked to complete a set of practice questions which helped them become familiar with the computer-assisted methodology.

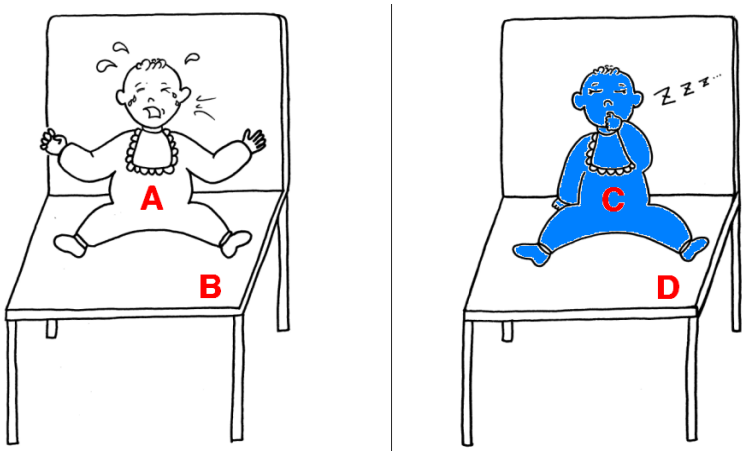
Each participant was tested individually in a quiet place by the researcher. Firstly, a pair of pictures appears on the monitor and introduces two identical characters or objects engaged in different actions. Right after the pair of pictures has appeared on

the screen, a pause of one second is given to the participant to provide time to quickly look though the pictures and letters (see (5.1a)) on them. After one second, one of the characters or objects in the pair of pictures changes to blue (see (5.1b)). The participants' task was to verbally indicate which character or object changed to blue, which created an obligatory context for the production of an RC, and expected to say (5.1c):

(5.1) a.



b.



c. uyca-eyse ca-nun aki-yeyyo.

chair-Loc sleep-Rel baby-SE

'(It is) the baby who is sleeping on the chair.'

Soon after they answer and press the enter key, the message 'Touch the enter key when you are ready to see the next question' appears on the monitor. When the participants touch the enter key after a pause, they can move to the next task of the PDT. The PDT took approximately 15-20 minutes and the participants' responses were recorded on the researcher's laptop using *Gom Recorder* software developed by Gretech Corporation. All the picture sets designed to elicit task RCs in PDT are presented in Appendix C.

5.2.3 Data transcription and coding

The elicited oral production was audio-recorded and orthographically transcribed into the Korean script *Hankul* by the researcher using Microsoft Word. There were no unclear recordings, but they were, nevertheless, double-checked for any potential errors in transcription. The data were then coded for targetlike and nontargetlike responses regarding the RC construction and accuracy of the modifying clauses, such as adnominal verbal suffixing, argument marking, and case marking. Targetlike responses therefore included the production of RCs with a gap in the expected position and appropriate verbal suffixing and case marking. Additionally, case marker or argument omissions in formation-recoverable contexts were also considered targetlike. In the following examples, (5.2b) is an example of the case marker omissions and (5.3b) is of the argument omissions:

(5.2) a. The targetlike answer:

theylleypicen-ul kku-nun namca

television-Acc turn off-Rel man

'the man who is turning off the television'

b. An example of case marker omissions:

theylleypicen (without the object marker *ul*) kku-nun namca

(5.3) a. The targetlike answer:

yek-eyse chulpalha-nun kicha

station-Loc depart-Rel train

'the train which is departing (from the station)'

b. An example of argument omissions:

(without the locative argument *yek-eyse*) chulpalha-nun kicha

Nontargetlike responses were coded according to three criteria: targetlikeness, task sufficiency, and grammaticality. In other words, nontargetlike responses included syntactic alternatives, task-insufficient responses, and ungrammatical responses.

The first type included responses that were not necessarily errors but rather alternative responses: Although not the same as the targeted RC form, these were grammatically acceptable alternatives, including passivization as appears in (5.4b), use of the possessive marker *–uy* as in (5.5b) and circumlocution in (5.6b):

(5.4) a. The targetlike answer:

ai-ka cap-nun cwi

kid-Nom catch-Rel mouse

'the mouse which the kid is catching'

b. An example of passivization:

ai-hanthey cap-hi-n cwi

kid-Dat catch-Pass-Rel mouse

'the mouse which is caught by the kid'

(5.5) a. The targetlike answer:

haksayng-i kongpuha-nun chayksang

student-Nom study-Rel desk

'the desk where the student is studying'

b. An example of use of the possessive marker *uy*:

suep-ul tut-koissnun haksayng-uy chayksang

class-Acc take-Rel student-Poss desk

'the desk of the student who is taking the class'

(5.6) a. The targetlike answer:

namca-ka ttena-nun hoysa

man-Nom leave-Rel company

'the company which the man is leaving'

b. An example of circumlocution:

yumyengha-n hoysa

famous-Rel company

'the famous company (indicating the SAMSUNG company in the picture)'

Another type of nontargetlike response is the grammatical but task-insufficient response. If the elicited response is in the form of relative construction but does not provide sufficient information to complete the task, then it falls under this task-insufficient category, as shown in (5.7b):

(5.7) a. The targetlike answer:

kay-ka po-nun mulkoki

dog-Nom see-Rel fish

'the fish which the dog is looking at'

b. An example of task insufficiency:

mul an-ey iss-nun sayngsen

water inside-Loc exist-Rel fish

'the fish which is in the water (of the fish bowl)'

Given that the task was set up in such a way that there are more than two characters in a picture and the participant's response should include all the characters in the context, participants should have been aware of the requirements of the task to avoid ambiguity or possibility for miscommunication. Therefore, the relative clause in (5.7b) used to describe the fish in Picture 11 (See Appendix C) in this experimental context was considered to be a nontargetlike response due to its task insufficiency.

Finally, ungrammatical responses included true errors that would cause incorrect form-meaning mapping or structurally ill-formed sentences. These errors included case errors, head reversals, head omissions, incorrect heads, an extra head copy before or after a head-internal RC, relativizer omission, and the failure to produce a RC at all, as shown in the following examples (5.8) to (5.12):

(5.8) Case error

a. The targetlike answer:

namca-lul tayli-nun yeca

man-Acc beat-Rel woman

'the woman who is beating the man'

b. An example of case errors:

namca-ka tayli-nun yeca

man-Nom beat-Rel woman

'the woman who the man is beating'

(5.9) Head reversal

a. The targetlike answer:

namca-ka kaci-n chayk

man-Nom have-Rel book

'the book which the man has'

b. An example of head reversals:

chayk-ul kaci-n namca

book-Acc have-Rel man

'the man who has the book'

(5.10) Head omission

a. The targetlike answer:

ai-ka cap-nun cwi

kid-Nom catch-Rel mouse

'the mouse which the kid is catching'

b. An example of head omissions:

ai-ka cap-nun

kid-Nom catch-Rel

‘(the head omitted) which the kid is catching’

(5.11) Incorrect head

a. The targetlike answer:

haksayng-i kongpuha-nun chayksang

student-Nom study-Rel desk

‘the desk where the student is studying’

b. An example of relative clauses with an incorrect head:

suep-ul tut-nun yeca

class-Acc take-Rel woman

‘the girl who is taking a class’

(5.12) An extra head copy before or after a head-internal RC

a. The targetlike answer:

theyllepicen-ul kku-nun namca

television-Acc switch off-Rel man

‘the man who is turning off the TV’

b. An example of the extra head copy before or after a head-internal RC

[NP [theylleypicen-ul po-nun] kes]-i kkuthna-nun namca

television-Acc watch-Rel thing-Comp-Nom finish-Rel.Present man

‘the man who finished watching TV’

(Literally, ‘the man finished the thing that he was watching TV’)

As for the accuracy of the modifying clauses, only the grammatical features of the RCs that are relevant to relativization were examined. In this regard, some deviant responses were not coded as nontargetlike responses because of their irrelevance to the purpose of the task. For example, lexical substitutions or errors (e.g., the substitution of *sathang* "candy" with the English loan word *khaynti* "candy", or the substitution of *aki* "baby" with *ai* "kid") were not penalized, and morphological errors (e.g., past relativizer (*u*)*n*, present progressive relativizer *koissnun*, or future relativizer (*u*)*l* instead of present/present progressive relativizer *nun*) were also considered acceptable depending on the situation appearing in the picture.

Additionally, after preliminary analysis, five task items, which appeared to elicit nontarget RC types when the target was reversed in PDT from LCT, were excluded from data coding and statistical analysis. Therefore, the number of RCs which actually used for data analysis of the PDT is 25 in total: 5 animate subject RCs, 4 inanimate subject RCs, 2 animate direct object RCs, 5 inanimate direct object RCs, 5 indirect object RCs and 4 oblique RCs.

5.3 Results: Statistical analysis of participants' responses

Results of the statistical analysis of participants' oral production data are discussed in this section together with the interpretations relating participants' responses to multiple factors of the experimental stimuli in the PDT.

Discussions in this section include 1) factors affecting participants' oral production of RCs and the interaction between these factors along with an overview on the statistical model used for data analysis (i.e. Generalized Estimating Equations, Section 5.3.1), 2) whether participants from different L1 backgrounds could

accurately produce the intended target RCs over 6 different types elicited by the experimental stimuli (Section 5.3.2), and 3) the effect of animacy on predicting participants' production of nontargetlike responses (Section 5.3.3).

5.3.1 Generalized Estimating Equations: Overview

The aim of the analysis reported in this section is to determine how much of the change in the participants' responses can be ascribed to changes in the multiple factors, such as RC types, L1, and their interaction as well as animacy, which appeared to be significant in processing RCs in the LCT.

For statistical analyses, Generalized Estimating Equations (GEE) were fitted to the data with IBM SPSS (Statistical Package for the Social Sciences) Version 20. GEE is an extension of the Generalized Linear Models (GZLM), which facilitate regression analyses on dependent variables that are not normally distributed (Nelder & Wedderburn, 1972; McCullagh & Nelder, 1989). GEE, firstly introduced by Liang and Zeger (1986), extends GZLM even further by providing support for correlated (non-independent) data, such as repeated measures logistic regression for within-subjects designs. GEE takes a dichotomous dependent variable and allows us to predict the probability of an event occurring given the levels of one or more predictors (i.e. independent/explanatory variables) with the individual contribution of the predictors.

GEE was chosen for the data analysis of the PDT, since a complicated structure of factors, including repeated measures and a binary categorical dependent variable, can only be treated appropriately in the GEE model. In the statistical analysis using GEE module, four variables are involved: one subject variable (Subject: Participant ID),

one categorical independent between-subject variable with four levels (L1: Korean/Japanese/Chinese/English), one categorical independent within-subject variable with six levels (RC types: animate SU/inanimate SU/animate DO/inanimate DO/IO/OBL relatization), and one binary dependent variable with two categories (targetlikeness of participants' responses: targetlike/nontargetlike responses regarding the RC construction and accuracy of the modifying clauses). The between-subject variable, L1, and the within-subject variable, RC types, are all categorical independent variables. In the GEE model, they were used as factors (i.e. predictors) instead of covariates, which are scale (interval numerically coded) predictors. Therefore, the SPSS output does not report individual significance levels for L1, RC types, and their interaction, as covariates, as shown in the Table 5.1.

For a dependent variable, participants' responses were classified into the dichotomy of targetlike vs. nontargetlike responses (i.e., targetlikeness = 0 = nontargetlike response, targetlikeness = 1 = targetlike response). As the dependent variable is binary with two values, coded 0 and 1, a binomial distribution with a logit link function, which is a transformation function that allows the dependent variable which is modelled to be expressed as a vector of parameter estimates, was used for the data analysis. The occurrence of the targetlike response was set as the reference category of the binary dependent variable, meaning that what is modelled is the probability of the dependent being targetlike rather than nontargetlike. In other words, the model-saved probabilities estimate the chance that a given case takes the value 0, a nontargetlike response, and parameter estimates should be interpreted as relating to the likelihood of category 0 in this situation. The interpretation of parameter estimates in GEE will be thus focused on how the nontargetlike response frequency changes throughout the chapter.

All the effects were reported as significant at $p < .05$. The model effect statistics showed that all the predictors, L1 and RC types, and their interaction of the GEE model, are statistically significant: the participants' first language had a significant main effect on targetlikeness of their oral production data, Wald $\chi^2(3) = 208.19$, $p < .001$, as did the types of relative clauses, Wald $\chi^2(5) = 489.92$, $p < .001$. As the interaction shows, there was also a significant association between the participants' first language and RC types that the participants' first language interacted with the RC types to predict targetlikeness of their oral production data, Wald $\chi^2(14) = 700.59$, $p < .001$. This indicates that the possibility of producing target RC types correctly differs in participants from different first language backgrounds, and therefore both L1 and RC types were significant predictors of the targetlikeness of participants' oral production data.

The details of the model parameters and their interaction are provided in Table 5.1, which specifically gives the actual model parameter for each effect (the *b* coefficient), the standard error of *b*, and the 95% Wald confidence intervals for *b*. The table also gives *exp(b)*, the odds ratios, which are effect size measures in logistics regression, with values above 1.0 reflecting positive effects and those below 1.0 reflecting negative effects. It is this value which is commonly used to interpret the importance of the effects of covariates and of levels of factors, and the odds ratio must be interpreted in relation to the reference categories. In this case, the reference categories are Korean native speakers, the control group, of the four L1s and animate SU RCs, the most accessible RC type according to the NPAH (Keenan and Comrie, 1977), of the six RC types. For categorical variables, the parameters for the reference categories are not shown, nor their significances:

		95% CI for odds ratio		
factors/interaction	*b* (SE)	*Lower*	*exp(b)*	*upper*
Intercept	-3.60 (0.68)***	0.01	0.03	0.10
Language 2	1.32 (0.74)	0.88	3.76	16.08
Language 3	1.84 (0.75)*	1.45	6.27	27.15
Language 4	1.32 (0.77)	0.82	3.76	17.14
RC Type 2	-21.96 (1.10)***	3.38E-11[20]	2.91E-10	2.51E-9
RC Type 3	3.73 (0.77)***	9.14	41.71	190.41
RC Type 4	1.16 (0.96)	0.48	3.17	20.83
RC Type 5	4.98 (0.74)***	34.02	146.00	626.56
RC Type 6	0.65 (0.73)	0.46	1.92	8.07
Language 2 x RC Type 2	20.15 [a]	< .001	5.65E8	< .001
Language 2 x RC Type 3	-2.00 (0.98)*	0.20	0.14	0.93
Language 2 x RC Type 4	-1.52 (1.12)	0.02	0.22	1.97
Language 2 x RC Type 5	-0.72 (0.85)	0.09	0.49	2.57
Language 2 x RC Type 6	-1.32 (1.10)	0.03	0.27	2.30
Language 3 x RC Type 2	22.22 (1.16)***	4.59E8	4.49E9	4.38E10
Language 3 x RC Type 3	-2.52 (0.95)**	0.01	0.08	0.52
Language 3 x RC Type 4	-0.96 (1.04)	0.05	0.38	2.96
Language 3 x RC Type 5	-2.21 (0.91)*	0.02	0.11	0.65
Language 3 x RC Type 6	-0.63 (0.87)	0.10	0.53	2.94
Language 4 x RC Type 2	22.50 (1.27)***	5.96E8	5.89E9	5.8E10
Language 4 x RC Type 3	-1.86 (0.87)*	0.03	0.16	0.85
Language 4 x RC Type 4	-1.32 (1.14)	0.03	0.27	2.51
Language 4 x RC Type 5	-1.48 (0.85)	0.04	0.23	1.19
Language 4 x RC Type 6	-0.25 (0.85)	0.15	0.78	4.15

a. Hessian matrix singularity is caused by this parameter. The parameter estimate at the last iteration is displayed.

Table 5.1. Summary of the effects in the Generalized Estimating Equation model (N = 1500, 15 participants × 4 L1s × 25 repeated measures of 6 RC types). The reference levels were Korean and the type of animate subject RCs. *b*s, the coefficients, indicate the unit of change of one level from the reference level. *exp(b)*, the odds ratio, can be interpreted such that, for instance, if its value is 3.76, it is 3.76 times more likely than the reference level that Korean was chosen. The 95% confidence intervals of the *exp(b)* are provided together with the estimated *exp(b)* values. Significance codes * $p < .05$, ** $p < .01$, *** $p < .001$.

In the table above, the shaded lines show the statistically significant results, which I

[20] En is a short way of saying "moves the decimal point to the right n places." For example, E10 means "times ten to the positive ten power" and "move the decimal point to the right ten places". If there is E-10, then it means "times ten to the negative tenth power" and "move the decimal point to the left ten places".

am going to discuss in the following sections. Considering the odds ratio, which is the estimation of how likely the response is affected by one unit of change of a certain parameter from the reference level, the odds of getting nontargetlike responses compared to targetlike responses are increased by a factor of 6.27 when the participants are Chinese speakers compared to Korean native speakers, as shown in Table 5.1 for the L1 factor. In other words, when the probability of Chinese speakers' getting nontargetlike responses is compared the possibility of Korean native speakers' getting nontargetlike responses, Chinese speakers were 6.27 times more likely to produce nontargetlike responses than Korean native speakers. As for RC types, the odds of getting nontargetlike responses are decreased by a factor of 2.91E-10 when the RC type is inanimate SU RC compared to animate SU RC. On the other hand, the odds are increased by a factor of 41.71 when the RC type is animate DO RC, and a factor of 146.00 when the RC type is OBL RC, compared to animate SU RC.

Interaction shows that the odds of getting nontargetlike responses compared to targetlike responses are decreased by a factor of 0.14 when Japanese speakers produce animate DO RCs compared to animate SU RCs. In contrast, the odds of getting nontargetlike responses responses are increased by a factor of 4.49E9 when Chinese speakers produce inanimate SU RCs instead of animate SU RCs. The odds are decreased by a factor of 0.08 when Chinese speakers produce animate DO RCs, and by a factor of 0.11 when they produce IO RCs. As for English speakers, the odds of getting nontargetlike responses compared to targetlike responses are increased by a factor of 5.89E9 when the given RC type is inanimate SU RCs compared to animate SU RCs. The odds are decreased by a factor of 0.16 when they produce animate DO RCs. These overall results indicate that the NPAH effect on RC types

across four different L1 groups was not shown even in RC production in L2 Korean, which is consistent with the results reported in processing tasks in Chapter 4.

5.3.2 The effects of the participants' first language and types of relative clauses

The results presented in the model parameters in Table 5.1 in Section 5.3.1 informed us that we have an overall significant difference in predicting an event occurring, but we do not know where those differences occurred. To closely investigate differences between levels across L1s and RC types and the interaction between these two variables, contrast analysis in GEE was conducted and estimated marginal means were computed for the factors and factor interaction, which allows comparison among groups formed by levels of the factors. In this case, the estimated means represent the "targetlikeness", in other words, getting nontargetlike responses for each L1 and RC type.

As for L1, getting nontargetlike responses for the control group of Korean native speakers was significantly smaller than three experimental groups: the targetlikeness of Korean speakers' responses was significantly different from Japanese speakers (mean difference = -0.15 s; 95% CI = -0.19, -0.10; $p < .001$), Chinese speakers (mean difference = -0.26 s; 95% CI = -0.32, -0.21; $p < .001$), and English speakers (mean difference = -0.22 s; 95% CI = -0.31, -0.13; $p < .001$). The Korean native speakers' highest performance in RC production was followed by Japanese learners of Korean: the targetlikeness of Japanese speakers' responses was significantly different from Chinese speakers (mean difference = -0.12 s; 95% CI = -0.19, -0.04; $p < .01$), but not significantly different from English speakers (mean difference = -0.07

s; 95% CI = -0.18, 0.03; p = .16). The targetlikeness of Chinese speakers' production data was significantly different from Korean and Japanese speakers, as described above, but not significantly different from English speakers (mean difference = 0.04 s; 95% CI = -0.06, 0.15; p = .43). The results of Pairwise Comparisons for L1 primarily show that the order of performance in producing targetlike RCs in Korean is Korean > Japanese > English > Chinese. However, the differences of targetlikeness of responses between Japanese and English, and between English and Chinese are not statistically significant.

Pairwise Comparisons for RC types shows that the order of getting targetlike responses is inanimate SU RCs > animate SU RCs > OBL RCs > inanimate DO RCs > animate DO RCs > IO RCs. The targetlikeness of inanimate SU RCs was significantly different from all other five RC types: It was significantly different from animate SU RCs (mean difference = -0.08 s; 95% CI = -0.11, -0.05; p < .001), OBL RCs (mean difference = -0.09 s; 95% CI = -0.13, -0.04; p < .001), inanimate DO RCs (mean difference = -0.09 s; 95% CI = -0.13, -0.06; p < .001), animate DO RCs (mean difference = -0.42 s; 95% CI = -0.51, -0.32; p < .001), and IO RCs (mean difference = -0.80 s; 95% CI = -0.86, -0.75; p < .001). The targetlikeness of responses with animate SU RCs was significantly different from inanimate SU RCs (mean difference = 0.08 s; 95% CI = 0.05, 0.11; p < .001), animate DO RCs (mean difference = -0.34 s; 95% CI = -0.44, -0.24; p < .001) and IO RCs (mean difference = -0.73 s; 95% CI = -0.78, -0.67; p < .001), but not significantly different from inanimate DO RCs (mean difference = -0.02 s; 95% CI = -0.07, 0.04; p = .55) and OBL RCs (mean difference = -0.01 s; 95% CI = -0.05, 0.04; p = .75). The targetlikeness of responses with OBL was significantly different from inanimate SU RCs (mean difference = 0.09 s; 95% CI = 0.04, 0.13; p < .001), animate DO RCs

(mean difference = -0.33 s; 95% CI = -0.44, -0.22; $p < .001$) and IO RCs (mean difference = -0.72 s; 95% CI = -0.79, -0.65; $p < .001$), but not significantly different from animate SU RCs (mean difference = 0.01 s; 95% CI = -0.04, 0.05; $p = .75$) and inanimate DO RCs (mean difference = -0.01 s; 95% CI = -0.06, 0.05; $p = .77$). The targetlikeness of responses with inanimate DO RCs was significantly different from inanimate SU RCs (mean difference = 0.09 s; 95% CI = 0.06, 0.13; $p < .001$), animate DO RCs (mean difference = -0.32 s; 95% CI = -0.42, -0.23; $p < .001$) and IO RCs (mean difference = -0.71 s; 95% CI = -0.77, -0.65; $p < .001$), but not significantly different from animate SU RCs (mean difference = 0.02 s; 95% CI = -0.04, 0.07; $p = .55$) and OBL RCs (mean difference = 0.01 s; 95% CI = -0.05, 0.06; $p = .77$). The targetlikeness of responses with animate DO RCs was significantly different from all other five categories: animate SU RCs (mean difference = 0.34 s; 95% CI = 0.24, 0.44; $p < .001$), inanimate SU RCs (mean difference = 0.42 s; 95% CI = 0.32, 0.51; $p < .001$), inanimate DO RCs (mean difference = 0.32 s; 95% CI = 0.23, 0.42; $p < .001$), IO RCs (mean difference = -0.39 s; 95% CI = -0.48, -0.30; $p < .001$) and OBL RCs (mean difference = 0.33 s; 95% CI = 0.22, 0.44; $p < .001$). Lastly, the targetlikeness of responses with IO RCs was also significantly different from all other five categories: animate SU RCs (mean difference = 0.73 s; 95% CI = 0.67, 0.78; $p < .001$), inanimate SU RCs (mean difference = 0.80 s; 95% CI = 0.75, 0.86; $p < .001$), animate DO RCs (mean difference = 0.39 s; 95% CI = 0.30, 0.48; $p < .001$), inanimate DO RCs (mean difference = 0.71 s; 95% CI = 0.65, 0.77; $p < .001$) and OBL RCs (mean difference = 0.72 s; 95% CI = 0.65, 0.79; $p < .001$).

The results of the Pairwise Comparisons indicate that the same conclusion holds for both processing and producing RCs in L2 Korean and no such hierarchical preference for a particular RC type was found in RC production in L2 Korean.

Moreover, in the order of getting targetlike responses in the oral production data - inanimate SU RCs > animate SU RCs > OBL RCs > inanimate DO RCs > animate DO RCs > IO RCs - the differences between adjacent RC types, such as between animate SU RCs and OBL RCs and between OBL RCs and inanimate DO RCs over four L1s, are not statistically significant.

To closely investigate the differences between levels of RC types in each L1 group, separate additional GEE analyses were conducted for each of the four L1 groups. The different orders of targetlikeness for each L1 from interaction of L1 and RC types are presented in Table 5.2.

Table 5.2. The orders of targetlikeness appeared in oral production data from the four L1 groups

RC types / L1		Getting targetlike responses ◄ ► Getting nontargetlike responses					
Getting targetlike responses ▲	Korean	SU_I	SU_A	OBL	DO_I	DO_A	IO
	Japanese	SU_I	OBL	DO_I	SU_A	DO_A	IO
	English	DO_I	SU_A	OBL	SU_I	DO_A	IO
Getting nontargetlike responses ▼	Chinese	SU_A	OBL	DO_I	SU_I	DO_A	IO

Table 5.2 displays the orders of getting targetlike responses for the six RC types over the four L1 groups. Above all, the IO RCs are seen as the RC type which is more likely than any other of the five RC types across four different L1s to get nontargetlike responses. For all L1s, the odds of getting nontargetlike responses compared to targetlike responses are increased when the RC type is animate DO RCs and IO RCs, which the final two columns in Table 5.2 have in common across the four L1s, compared to animate SU RCs, which is known as the most accessible according to the NPAH.

For Korean, the odds of getting nontargetlike responses compared to targetlike

responses are increased by a factor of 41.71 when the RC type is animate DO RCs ($p < .001$) and by a factor of 146.00 when it is IO RCs ($p < .001$), compared to animate SU RCs. Estimates confirm that the targetlikeness of responses with inanimate SU RCs was higher than all other five categories and the order of targetlikeness of responses by Korean native speakers is SU_I > SU_A > OBL > DO_I > DO_A > IO. However, Pairwise Comparisons showed the targetlikeness of responses with inanimate SU RCs was not significantly different from animate SU RCs (mean difference = -0.30 s; 95% CI = -0.06, 0.01; $p = .13$). The targetlikeness of responses with animate SU RCs was not significantly different from OBL RCs (mean difference = -0.02 s; 95% CI = -0.08, 0.03; $p = .38$) and, likewise, the targetlikeness of OBL RCs was not significant from inanimate DO RCs (mean difference = -0.03 s; 95% CI = -0.14, 0.08; $p = .58$). On the other hand, in responses by Koreans there was a significant difference in targetlikeness between inanimate DO RCs and animate DO RCs (mean difference = -0.45 s; 95% CI = -0.64, -0.27; $p < .001$) and between DO_A and IO (mean difference = -0.27 s; 95% CI = -0.41, -0.13; $p < .001$).

For Japanese L1 speakers, the odds of getting nontargetlike responses compared to targetlike responses are increased by a factor of 5.62 when the RC type is animate DO RCs ($p < .01$) and by a factor of 71.24 when it is IO RCs ($p < .001$), compared to animate SU RCs. Regarding the order of targetlikeness of responses by Japanese speakers, SU_I > OBL > DO_I > SU_A > DO_A > IO, Pairwise Comparisons showed that only the targetlikeness of responses with animate SU RCs is significantly different from animate DO RCs (mean difference = -0.27 s; 95% CI = -0.50, -0.04; $p < .05$) and animate DO RCs from IO RCs (mean difference = -0.51 s; 95% CI = -0.73, -0.30; $p < .001$).

As for Chinese L1 speakers, the odds of getting nontargetlike responses compared

to targetlike responses are increased by a factor of 3.37 when the RC type is animate DO RCs ($p < .05$) and by a factor of 16.00 when it is IO RCs ($p < .001$), compared to animate SU RC. Estimates showed that the order of targetlikeness of responses by Chinese speakers is SU_A > OBL > DO_I > SU_I > DO_A > IO, in which only the targetlikeness of responses with animate DO RCs is significantly different from IO RCs (mean difference = -0.37 s; 95% CI = -0.52, -0.21; $p < .001$).

Lastly, for English L1 speakers, the odds of getting nontargetlike responses compared to targetlike responses are increased by a factor of 6.48 when the RC type is animate DO RCs ($p < .001$) and by a factor of 33.14 when it is IO RCs ($p < .001$), compared to animate SU RC. The order of targetlikeness of responses by English speakers is DO_I > SU_A > OBL > SU_I > DO_A > IO. Among the adjacent RC types, there was a significant difference in targetlikeness for responses by English speakers between inanimate SU RCs and animate DO RCs (mean difference = -0.25 s; 95% CI = -0.45, -0.05; $p < .05$) and between animate DO RCs and IO RCs (mean difference = -0.37 s; 95% CI = -0.56, -0.19; $p < .001$).

The overall results indicate that the possibility of producing target RC types correctly differs in participants from different first language backgrounds, and therefore both L1 and RC types were significant predictors of the targetlikeness of participants' oral production data. However, the targetlikeness tended to show no consistency with either the accessibility suggested by Keenan and Comrie (1977) or the outcomes determined by processing tasks in Experiment 1. The pattern of RC type order in terms of targetlikeness across the four different L1 groups will be discussed further in Section 5.4 along with the differences of processing and production processes.

5.3.3 The effects of animacy

Next, with regard to the main effect of animacy, another GEE was carried out to investigate whether animacy of the head noun affects predictions for targetlikeness in producing SU and DO headed relative clauses. For the statistical analysis looking at the effect of animacy, five variables are involved: one subject variable (Subject: Participant ID), one categorical between-subject predictor with four levels (L1: Korean/Japanese/Chinese/English), one categorical predictor with two levels (RC types: SU/DO relatization), another categorical predictor with two levels (Target animacy: animate/inanimate head noun), and one binary dependent variable with two categories (targetlikeness of participants' responses: targetlike and nontargetlike responses in terms of the RC construction and accuracy of the modifying clauses). Because of the binary dependent variable, a binomial distribution with a logit link function is used again to transform the dependent variable which is modelled.

All the effects were reported as significant at $p < .05$. The model effect statistics of GEE give a test (by default, a Wald chi-square test using Type Ⅲ sums of squares) for each model effect, with a corresponding significance level, and these can be used to ascertain the significance of predictors to the model. It showed that the predictors, L1, RC types, and animacy, and their interactions of the GEE model, are all statistically significant: The participants' first language had a significant main effect on the targetlikeness of their oral production data, Wald $\chi^2(3) = 238.68$, $p < .001$, as did the types of relative clauses, Wald $\chi^2(1) = 166.16$, $p < .001$. Animacy of head nouns also had a significant effect on targetlikeness in L2 RC production, Wald $\chi^2(1) = 157.33$, $p < .001$. Their interactions also showed significant effects on predicting the targetlikeness of the relative clauses produced by Korean native speakers and L2

Korean learners: language*RC types, Wald $\chi^2(3) = 230.22$, $p < .001$, language*animacy, Wald $\chi^2(3) = 284.92$, $p < .001$, RC types*animacy, Wald $\chi^2(1) = 74.18$, $p < .001$, language*RC types*aimacy, Wald $\chi^2(2) = 527.44$, $p < .001$. Therefore, the null hypothesis is rejected, and animacy as well as L1 and target RC type is also a significant predictor of the targetlikeness of participants' responses. This indicates that the possibility of producing target RC types correctly is differed in animacy of the head noun as well as participants from different first language backgrounds, and therefore animacy of the head noun in addition to L1 and RC types is a significant predictor of the targetlikeness of participants' oral production data.

To test whether the similar processing accessibility for animate SU RCs and inanimate DO RCs in Experiment 1 also appears in L1 and L2 Korean speakers' oral production of the two RC types, Pairwise Comparisons were performed: although animate SU RCs are more likely to get targetlike responses than inanimate DO RCs over four different L1s, the targetlikeness of responses with the two RC types are not significantly different (mean difference = -0.02 s; 95% CI = -0.07, 0.04; $p = .55$). From the comparisons, the targetlikeness of animate SU RCs and inanimate DO RCs in oral production is not significantly different, which is consistent with the results from LCT in Experiment 1. Therefore it is fair to say that the accessibility to these two RC types is similar in both processing and production in L1 and L2 Korean.

5.4 Discussion

Experiment 2, the Picture Description Tasks (PDT), was designed to investigate the effect of multiple factors on RC production in L2 Korean, which had significant effects on processing Korean RCs, by manipulating them in a comparable manner to

Experiment 1, the Listening Comprehension Tasks (LCT). The results of Experiment 2 primarily showed that no NPAH effect was found in RC production in L1 and L2 Korean. Instead, all the factors - L1, RC types, and animacy of the head noun - influence L2 Korean learners' RC production, just as they influence their RC processing in Experiment 1.

As presented in Table 5.2, targetlikeness of responses for each RC type observed in L2 Korean learners' oral production data showed some consistent outcomes across different L1 groups, which also denies the NPAH effect in L2 Korean. Some possible cues which might shape the outcomes in producing RCs in L2 Korean are: 1) verb types, 2) argument dependencies on the verb types, and 3) semantic properties of the argument dependencies, including animacy of the head noun of relative clauses.

5.4.1 The effect of argument dependences regarding verb types

The most striking finding in the oral production data from the four L1 groups is that participants showed the lowest production performance on IO RCs, which is broadly consistent with the results in RC comprehension in Experiment 1, as shown in Figure 5.1:

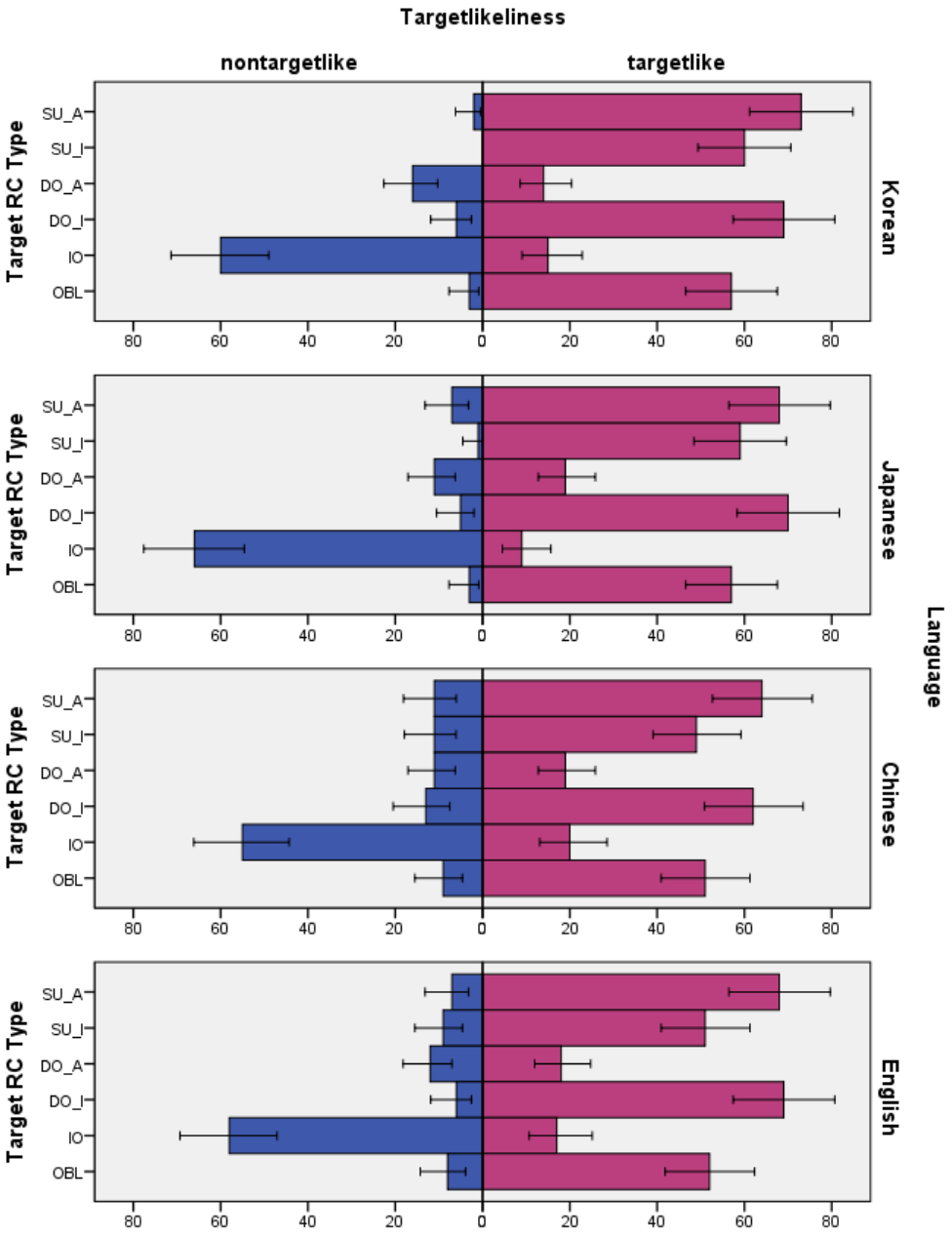


Figure 5.1. The orders of targetlikeness (the number of nontargetlike and targetlike responses produced for six RC types) shown in the oral production data from the four L1 groups

The participants' low performance shown in both processing and producing IO RCs across their L1s reveals the complexity of IO relativization regardless of the word order of the language. In this respect, O'Grady (2004) assumed that there is no direct influence of grammar and, rather, sentences are interpreted and formed by an efficiency-driven processor whose operation is designed to minimize the burden on

working memory. In the present Experiments 1 and 2, it seems that the efficiency-driven processor has an increased workload for L1 and L2 speakers of Korean when they are asked to process and produce more complex RC types. The effect was indeed shown when they had to process and produce IO RCs. As an illustration of how this might work with IO RCs in Korean, let us first consider the argument structure of a verb used to test L2 Korean speakers' processing and production of IO RCs in the present research, such as *cwuta* 'give' in (5.13a), and the actual formation of the sentence with the verb in Korean as in (5.13b):

(5.13) a. *cwuta* 'give' <agent, recipient, theme>

b. namca-ka yeca-hanthey senmwul-ul cwu-ta.
man-Nom woman-Dat present-Acc give-Dec
| | |
Agent Recipient Theme
'The man gives a present to the woman.'

As illustrated above, the lexical entry for the ditransitive verb *cwuta* 'give' indicates that it has three argument dependencies. If the recipient *yeca* is taken out of the structure (5.13b) and relativized by moving it to the head-final position after the verb, the verb *cwuta* now requires two arguments, *namca* and *senmul*, to its left as in (5.14):

(5.14) namca-ka senmwul-ul cwu-nun yeca

man-Nom present-Acc give-Rel woman

| | |

Agent Theme Recipient

'The woman to whom the man is giving a present'

Unlike other verb types used for other relativization in the LCT and the PDT, IO relative clauses with a ditransitive verb have a more complex internal structure, having two arguments, as shown in (5.14), which might explain the participants' increased workload and low performance in both processing and producing IO RCs across their L1.

Interestingly, the operation of the efficiency-driven processor in both processing and production of IO RCs in Korean is not compatible with the linear distance between a filler and a gap, which predicts the same processing difficulty of IO and SU RCs while addressing the processing ease of DO RCs over SU RCs in Korean under the current experimental manipulation: both IO and SU RCs have two discourse referents, one NP and a main verb, between the gap and the head (see Section 4.5.2), as displayed in Table 5.3.

Table 5.3. The linear-distance and argument dependencies of RC types used in the present experiment

RC types	**RC construction in LCT and PDT**	**The number of intervening discourse referents between a filler and a gap**	**The number of arguments in RC regarding verb types**
SU	$[_{RC}\ e_i$ Object Verb-rel] $filler_i$	2	1
DO	$[_{RC}$ Subject e_i Verb-rel] $filler_i$	1	1
IO	$[_{RC}$ Subject e_i Object Verb-rel] $filler_i$	2	2
OBL	$[_{RC}$ Subject e_i Verb-rel] $filler_i$	1	1

One possible explanation for such discrepancy is that the processing difficulty of relative clauses increases with the length of the filler-gap dependency in terms of intervening new discourse referents (see Section 3.4.6), but the argument dependency in RC constructions overrides the power of the filler-gap dependency in both processing and production of RCs in Korean. In other words, as Korean is head-final and left-branching, the efficiency-driven processor must primarily resolve the linear filler-gap dependency in RC construction from left to right. However, if there is any ambiguity caused by the same linear distance between the filler and the gap in the RC construction, such as in the SU and IO RCs in Table 5.3, the argument dependency will subsequently intervene in resolving such ambiguity, combining the verb with its arguments one at a time, rather than the merely exclusive effects of the NPAH on relativization.

In this respect, the most frequent nontargetlike response – argument omission with task insufficiency in a non-recoverable context – appeared in the production of IO RCs in all four L1 groups. This provides additional support for the primacy of the argument dependency over the filler-gap dependency in producing RCs in Korean, as shown in (5.15) below:

(5.15) nontargetlike argument omission in a non-recoverable context

a. The targetlike answer:

sacangnim-i ai-lul sokayha-nun yeca

president-Nom child-Acc introduce-Rel woman

'the woman to whom the president is introducing the child'

b. An example of the nontargetlike argument omission in a non-recoverable context:

sacangnim-i sokayha-nun yeca

president-Nom introduce-Rel woman

'the woman who the president is introducing'

(the woman here is a direct object head (DO RC))

Given that the task, exemplified in (5.15), was set up in such a way that there are more than two characters in a picture, participants of the experiment were instructed beforehand that they should include all the characters in the context, each one of which has their own role as an argument, to avoid ambiguity or possibility for miscommunication. However, by omitting the theme of the argument structure, *ai* 'the child', from (5.15a), the participants can efficiently reduce the burden of working memory for planning and uttering elements following the agent *sacangnim* 'the president' in the IO RC structure. In addition, they can subsequently convert the IO RC into a DO RC, which requires less resolving effort in RC construction in Korean in terms of both argument and filler-gap dependencies. As a result, such a converting strategy reduces the relative complexity of the argument structure of IO RCs and, at the same time, narrows the linear distance between the filler and the gap in the IO RCs over the rest of the RC types in the present experiment. Another frequent nontargetlike argument omission is the example (5.16):

(5.16) nontargetlike argument omission with task insufficiency

a. The targetlike answer:

namca-ka senmwul-ul cwu-nun yeca

man-Nom present-Acc give-Rel woman

'the woman to whom the man is giving the present'

b. An example of the nontargetlike argument omission with task insufficiency:

senmwul-ul pat-nun yeca

present-Acc receive-Rel woman

'the woman who is receiving the present (from someone)'

In (5.16), speakers of such an RC convert the indirect object head *yeca* 'woman' into a subject head by adopting the verb *patta* 'receive', instead of *cwuta* 'give', resulting in the entire structural change of the IO RC to an SU RC, which is grammatical but task-insufficient. In terms of the filler-gap dependency, there is no difference between the IO and the SU RC, causing ambiguity as shown in Table 5.3. However, by omitting the agent *namca* from the targetlike answer (5.16a), the speakers of such an RC can achieve a loss in workload in terms of resolving the argument dependency, combining the verb *patta* 'receive' with only one argument, *senmwul* 'present', on its left, and, subsequently, they can also settle the ambiguity of the filler-gap dependency between the IO and the SU RC.

In sum, the participants' low performance shown in both producing and processing IO RCs across their L1 revealed the complexity of IO relativization in Korean, which increases the L1 and L2 Korean speakers' workload when they are required to produce or process IO RCs. Such complexity might be associated with not only the filler-gap dependency but also the argument dependency regarding verb types. Finally, the participants' frequent nontargetlike responses with IO RCs in the present experiment explain the assumption that the processing difficulty of relative clauses increases with the length of the filler-gap dependency, but the argument dependency in RC construction overrides the power of the filler-gap dependency in

both producing and processing RCs in Korean.

5.4.2 The role of animacy and verb properties in production

Another key finding over the different L1s is that participants also produced a significant rate of nontargetlike responses when they were expected to produce animate DO RCs, which took right after IO RCs, as shown in Table 5.2. It is also broadly consistent with the results of the LCT: animate DO RCs and inanimate SU RCs were less preferred than inanimate DO RCs and animate SU RCs, which were similarly more accessible to relativization, over the four L1s (see Section 4.4.2 to review the results of RC processing in L2 Korean).[21]

An interesting point in the results is that the same verb type - transitive verbs such as *pota* 'see' and *capta* 'catch' with an agent and a patient or a theme in its argument structure - as in animate SU and inanimate DO RCs was used for testing animate DO RCs in this research. Under such experimental manipulations, the low performance on animate DO RCs overall was then affected by the animacy of the entities as this is the salient difference of animate DO RCs from animate SU and inanimate DO RCs used in this research. The animate SU and inanimate DO RCs involved in this experiment were under the exactly same experimental condition along with manipulation of the entity inside the relative clause: subjects are animate and objects are inanimate. However, in the animate DO RCs, the head nouns and the NPs in the relative clauses are both animate. The lower production performance on animate DO RCs in such conditions over animate SU and inanimate DO RCs therefore confirms

[21] Interestingly, despite other L2 groups' overall preference for inanimate DO RCs and animate SU RCs, both Korean and Japanese speakers showed the highest production performance on inanimate SU RCs. Korean and Japanese speakers' preference to inanimate SU RCs in production will be discussed in Section 5.4.3.

that the animacy of the entities in DO RCs did in fact influence the structure of the production: animate headed object relative clauses with animate agents are more difficult to comprehend and produce than object relatives with inanimate heads across languages.

Gennari and MacDonald (2008) attributed this difference to semantic indeterminacy, which is a major source of comprehension difficulty in object relative clauses. The data of the present research, as well as Gennari and MacDonald's (2009), show that speakers across languages do not preferably produce animate object RCs. It is possible that the semantic similarity between the two animate nouns in RC construction also causes difficulty for the speaker. A pair of animate nouns that are similar to each other and can both act as reasonable agents in a sentence may be more easily confused and thus more difficult for speakers to plan to utter.

Regarding the semantic similarity between the two animate entities in the animate DO RCs, it is worth noting that the compelling error type with animate DO RCs is passivization as in (5.17):

(5.17) nontargetlike passivization

a. The targetlike answer:

ai-ka cap-nun cwi

kid-Nom catch-Rel mouse

'the mouse which the kid is catching'

b. An example of passivization:

ai-hanthey/eykey cap-hi-n cwi

kid-Dat catch-Pass-Rel mouse

'the mouse which is caught by the kid'

This error type in (5.17) was frequently found in the data produced by Korean (25%) and Japanese (20%), a little by Chinese (5%), and none by English speakers. In other words, Korean and Japanese speakers are more likely to passivize the verb if there are two animate entities in the structure. One possibility of the reason behind this nontargetlike passivization is that Korean and Japanese DO RCs can also occur as either active object relative or passive relative clauses. Unlike English, Korean and Japanese active and passive relative clauses have identical word order across all words of the relative clauses.

In particular for Korean and Japanese, the only difference between active and passive forms is the case marker after the embedded noun, for example, *ai* 'kid' in (5.17), and the addition of the passive verb suffix *–hi–*. As the frequency of the nontargetlike passive constructions are not similar across the languages, it is likely that different cognitive processes underlie structure choices for Korean and Japanese speakers. It may be that, although the production data showed a main effect of animacy over the four language groups, language specifically, Korean and Japanese speakers might respond to planning difficulty derived from semantic similarity of two animate entities in different ways: they might modulate the difficulty caused by the semantic properties of two animate entities in animate DO RCs by changing the case markers and passivizing the verb in the RC structure as in (5.17b), where no word order changes are required.

Another frequent error type with animate DO RCs is task-insufficient responses as in (5.18):

(5.18) task-insufficient response

a. The targetlike answer:

kay-ka po-nun mulkoki

dog-Nom see-Rel fish

'the fish which the dog is looking at'

b. An example of task insufficiency:

mul an-ey iss-nun sayngsen

water inside-Loc exist-Rel fish

'the fish which is in the water (of the fish bowl)'

This error type was frequently observed in Korean (55%), English (27%), Japanese (20%), and Chinese speakers' (20%) responses. This result clearly represents that animate DO RCs are less frequently produced regardless of the learners' L1 background. Instead, the learners employed intransitive verbs, such as *issta* 'to be located (in)' in this context, and transformed animate DO RCs into animate SU RCs, in favour of animate SU RCs over animate DO RCs, which is broadly consistent with the results found in processing tasks in the LCT.

5.4.3 Language-specific error types and unsolved questions

The role of argument dependencies and animacy along with verb properties in the targetlikeness of L2 Korean learners' RC production data was discussed in view of the results of both processing and production tests for RCs in L2 Korean. However, some language-specific error types were found in oral production data, which influenced data coding and also statistical analyses of the data in later stages, and the detail about how the language-specific errors were occured has not been fully clarified. Some of the questions raised in both LCT and PDT and the experiments'

limitations are discussed in this section.

Firstly, regarding the results of Korean and Japanese speakers' production of RCs, it should be noted that the results primarily showed the same order of targetlikeness as SU_I > SU_A > OBL > DO_I > DO_A > IO before two of the coding criteria (see 5.2.3) were changed as explained with the examples (5.4) and (5.8). However, Japanese speakers frequently produced grammatically incorrect animate SU RCs with passivized verb forms. Given the reconstructed coding criteria, Japanese speakers' consistent errors of inaccurate passivization with case errors, as shown in (5.19), were recoded as nontargetlike:

(5.19) a. The targetlike answer:

mwun-ul tat-nun namca

door-Acc close-Rel man

'the man who is closing the door'

b. An example of inaccurate passivization with case errors:

mwun-ul tat-hi-nun namca

door-Acc close-Pass-Rel man

'the man who is making the door closed (inaccurate response)'

Secondly, the lowest performance shown by Chinese speakers might be due to their frequent omission of cases, which is often a critical point of accurate RC construction. If the case marker or argument ommisions occurred in formation-recoverable contexts, they were considered targetlike, as in the example (5.2). However, if the RC has any ambiguity caused by the case marker or argument ommisions, it is not clear at all who the agent of the action is as this should be

decided depending on the subject or object case markers in the RC construction, as in (5.20):

(5.20) a. The targetlike answer:

namca-lul ttayli-nun yeca

Man-Acc hit-Rel woman

'the woman who is hitting the man'

b. An example of ambiguous case marker or argument ommisions:

namca ttayli-nun yeca

man hit-Rel woman

'the woman who is hitting the man *or* the women who is hit by the man'

Addtionally, as addressed in Section 5.4.2, one may raise a problem of the generalizability of L2 Korean speakers' avoidance of inanimate SU RCs in RC production. Interestingly, despite of other speakers' overall preference for inanimate DO RCs and animate SU RCs, both Korean and Japanese speakers showed the highest production performance on inanimate SU RCs. This result is significantly different from the results that appear in English and Chinese groups, where inanimate SU RCs were less targetlike, following animate DO and IO RCs as shown in Table 5.2. The difference between these two groups probably indicates that, for Korean and Japanese speakers, the interaction of thematic roles and verb types may play a greater role in RC production than animacy, which significantly affects English and Chinese speakers' performance. For example, *tochakhata* 'arrive', one of the intransitive verbs used in the PDT, is a predicate which takes only one argument, normally an agent to its left in Korean, as in (5.21), although it required an

inanimate agent and a location in the PDT as illustrated in (5.22):

(5. 21) *tochakhata* ‘arrive’ <agent>

(5. 22) a. *tochakhata* ‘arrive’ <agent, location>

b. yek-ey tochakha-nun kicha

station-Dat arrive-Rel train

| |

Location Agent

‘the train which is arriving in the station’

In contrast to the results of Korean and Japanese speakers’ preference for inanimate SU RCs, the English and Chinese groups’ performance on inanimate SU RCs was the third lowest, after animate DO and IO RCs. A possible explanation for the results of English groups can be found in the proposal that English speakers have a tendency to locate animate concepts at initial positions in the sentence (Clark 1965; Bates & MacWhinney, 1982; Bock, 1982; Bock, 1987; Bock, Loebell, & Morey, 1992). This observation has often been cast in terms of subjecthood because, in English, words that are mentioned first are strongly correlated with syntactic subjects. As shown in the results of the current experiment, this tendency is particularly noticeable when English speakers are asked to produce inanimate DO RCs and animate SU RCs, which appear in the first two columns in Table 5.2. The two RC types in the present experiment begin with an animate subject, which is the agent of the action. Accordingly, the tendency might have resulted in English speakers’ preference for

animate DO RCs and their nontargetlike responses for inanimate SU RCs.

5.5 Summary

Experiment 2, the computer-assisted Picture Description Tasks, was designed to investigate the effects of multiple factors – RC types, L1, and animacy – which significantly influenced the results of RC processing in L2 Korean in Experiment 1 and to test how robust their effects are over the four L1 groups' oral production data. Experimental materials used for the PDT were six identical RC types which systematically correlate to the RCs used in the LCT: RCs with animate SU, inanimate SU, animate DO, inanimate DO, IO, and OBL heads. The general findings from data analysis are that all the factors significantly affected targetlikeness of participants' responses aross four different L1s and the targetlikeness tended to show no consistency with the NPAH effect, as in Experiment 1.

Data analysis revealed that the possibility of producing target RC types correctly differs in participants from different first language backgrounds, implying that both L1 and RC types are significant factors influencing not only comprehension but also production of RCs in L2 Korean. In addition, animacy of the head noun also affects predictions for targetlikeness in producing SU and DO headed RCs. The targetlikeness of animate SU RCs and inanimate DO RCs in oral production was not significantly different, representing that the accessibility of these two RC types is consistently similar in both RC processing and production in L2 Korean.

Furthermore, results suggest that the argument dependencies and semantic properties of the argument dependencies regarding verb properties may bring about some consistent outcomes across different L1 groups in the PDT. The most

noticeable result in the PDT was that participants showed the lowest production performance on IO RCs, which is broadly consistent with the results in the LCT. The nontargetlike tendency of having less arguments in IO RC constructions seems to be strongly related to the complexity of IO relativization in Korean, rather than the merely exclusive effect of the NPAH: the processing difficulty of relative clauses increases with the length of the filler-gap dependency, but the argument dependency in RC construction possibly overrides the power of the filler-gap dependency in both producing and processing RCs in Korean. Another interesting result was the lower production performance on animate DO RCs over animate SU and inanimate DO RCs. This may reflect the observation that the animacy of the entities in DO RCs did in fact influence the structure of the production instead of the NPAH effect exclusively: animate headed object relative clauses with animate agents are more difficult to comprehend and produce than object relatives with inanimate heads across languages. Nevertheless, the consistent outcomes across different L1 groups demonstrated that there is no such exclusive hierarchical accessibility to relativization and, instead, various factors influence RC production as well as processing in L2 Korean, separately and/or jointly.

CHAPTER 6

Conclusion

6.1 Introduction

This thesis has examined the applicability of the implicational hypothesis of relative clauses in typological universals, the Noun Phrase Accessibility Hierarchy (NPAH) hypothesis (Keenan and Comrie, 1977), to Korean as a foreign language and explored how syntactic and semantic aspects of Korean noun-modifying clauses intersect with typological universals. In linguistic typology, it seems that general consensus has been reached regarding the effects of the NPAH in the acquisition of relative clauses in English and other European languages. However, the question of whether or not the acquisition of RCs in East Asian languages, such as Japanese, Chinese, and Korean, follows the hierarchy has been the source of controversy, and has attracted much attention recently: the number of studies carried out to examine typological universals in these languages is still relatively small compared to similar studies in English and European languages. Moreover, empirical SLA studies in such languages have consistently reported conflicting results (Tarallo & Myhill, 1983; Matthews & Yip, 2002; O'Grady, Lee & Choo, 2003; Ozeki & Shirai, 2007a; Jeon & Kim, 2007).

Korean is a particularly interesting target for investigating typological universals of relative clauses: Korean exhibits a quite large degree of restrictive semantic and

pragmatic constraints on RC construction as opposed to RCs in European languages (see Chapter 2). Recent research, much of which has focused on the RCs of East Asian languages, has argued that these RCs do not follow the same typological generalizations as those of European languages. In this respect, a particularly important proposal in linguistic typology is recently developed by Comrie. Comrie (2002) argues that the relativizability in East Asian languages (e.g. Japanese, Chinese and Korean) is constrained not by grammatical relations but by semantic and pragmatic factors, and the relative clauses in these languages thus do not follow the same typological or acquisitional generalization as those of European languages. To investigate the applicability of the typological universals to Korean, I tested 60 subjects from four different first language backgrounds (Korean, Japanese, Chinese, and English) using two computer-assisted RC tests, focusing on multiple factors affecting RC comprehension and production, such as type of relative clause, learners' first language background, and animacy of the head noun.

In the rest of this chapter, findings from Experiments 1 and 2 are recapitulated in Section 6.2, and the semantics and pragmatics of noun-modifying constructions in Korean are discussed in Section 6.3. Some implications for language pedagogy of relative clauses in Korean are discussed in Section 6.4, followed by a summary in Section 6.5.

6.2 The role of multiple factors in RC acquisition of L2 Korean

6.2.1 L2 Korean speakers' comprehension of RCs

In Experiment 1, the Listening Comprehension Tasks (LCT), participants' reaction

times were analysed to investigate different RC types in Korean in terms of cognitive processing. L2 Korean speakers from three different first language backgrounds, as well as a group of Korean native speakers, listened to thirty audio recorded task sentences consisting of six types of relative lauses in Korean (RCs with animate SU, inanimate SU, animate DO, inanimate DO, IO, and OBL heads) and were asked to choose the answers matching the task sentences. The significant advantage of using the computer-assisted RC processing test is that the participants' reaction times and answers to each stimulus are instantly recorded and marked, which settles the methodological limitations in terms of reliability of experimental outcomes which appeared in previous RC studies.

The results offered evidence that the NPAH effect, i.e. the hierarchical accessibility to different RC types, is not typologically universal. Instead of the NPAH effect, multiple factors – RC types, L1 and animacy – are involved in the cognitive processing of RCs in Korean. Data analysis revealed that there were statistically significant main effects of the type of relative clause, participants' first language background, and their interaction on the participants' reaction time in comprehending the relative clauses. In other words, the accessibility of different types of relative clauses differed in participants from different L1 backgrounds. However, the reaction times taken for processing relative clauses with an inanimate direct object head noun, an animate subject head noun, and an animate direct object head noun were not significantly different from each other overall. As for the L1 effect, Korean native speakers' reaction times were fastest, followed by Japanese and Chinese speakers, and then English speakers. Additionally, strong similarities of performance in between Korean and Japanese, and between Chinese and English, were also found.

The results also showed that the semantic factor of animacy of the head noun of relative clauses affects the analysis of relative clauses. The reaction times for animate SU and inanimate DO RCs are not significantly different over the four L1s. The data indicate that animate SU and inanimate DO RCs are similarly more accessible to relativization across different L1s and show the possibility that readers use semantic information to guide parsing of relative clauses.

However, the effect size of RC type and L1 was greater than animacy, implying that semantic information was not enough to override the preference for object relative clauses. The processing advantage of objects clearly coincides with the prediction made by the Linear Distance Hypothesis, rather than the Structural Distance Hypothesis, by proving that object relative clauses (OR) are easier to process than subject relatives (SR) in prenominal and head-final RCs.

Consequently, the current experiment provides strong support for such a multi-factor approach to RC processing with evidence in support of both learning strategies and language universals. The results indicate that the effect of the accessibility hierarchy of relativized grammatical functions was not found in L1 and L2 performance on processing relative clauses in Korean. From the results of the present study, it can be concluded that the NPAH effect, the implicational hypothesis of accessibility to relative clauses, is not universal.

6.2.2 L2 Korean speakers' production of RCs

Experiment 2 was designed to identify whether the effects of multiple factors in RC processing also influence RC production in L2 Korean. Experimental stimuli were six identical RC types which systematically correlate to the RCs used in Experiment

1. The same participants from Experiment 1 were tested using computer-assisted Picture Description Tasks and their oral production data were recorded and transcribed for data analysis.

The overall results showed that the NPAH effect on RC types across four different L1 groups was not found in RC production in L1 and L2 Korean, which is consistent with the results of RC processing in Experiment 1. Moreover, statistical analysis proved that all the multiple factors – L1, RC types and animacy – significantly affected targetlikeness of participants' responses across four different L1s.

In addition to the statistical significance of the multiple factors, the association between verb properties and the complexity of the argument dependencies was observed. Participants over four L1 groups tended to produce nontargetlike responses most when they were asked to produce IO RCs. It seems that L1 and L2 Korean speakers could ease the complexity of IO RCs by swapping IO RCs for other RC types with fewer arguments. The results showed that the argument dependency in RC construction possibly overrides the power of the filler-gap dependency in L2 Korean.

It was also found that semantic properties such as animacy of entities in RC construction also affected the results. Participants showed the lower performance on animate DO RCs over animate SU and inanimate DO RCs. This may reflect animate headed object relative clauses with animate agents are more difficult to comprehend and produce than object relatives with inanimate heads across languages.

To summarise, the results of Experiments 1 and 2 indicate that the same conclusion holds for both processing and producing RCs in L2 Korean: that there is no such exclusive hierarchical preference for a particular RC type. Rather, multiple syntactic and semantic factors influence RC processing and production.

6.3 Significance of semantics and pragmatics of noun-modifying constructions in Korean

As opposed to RCs in European languages, Korean exhibits quite a large degree of restrictive semantic and pragmatic constraints on RC construction (see Section 3.3.1 and 3.4.2). As recently proposed by Comrie (2002), the acceptability of noun modifying constructions in Korean, along with many Asian languages, relies considerably on native speakers' establishing a plausible interpretation.

In this respect, the fundamental question in terms of acquisition and processing of modifying clauses in L2 Korean would be whether the NPAH effect could still be observed if the relativized head and the gap in the RC are not coindexed by syntactic operations but loosely adjoined and pragmatically interpreted as in attributive clauses. At first blush, one could interpret the experimental findings in this thesis as an argument against the syntactic movement theory assumed in Government-Binding (GB) accounts. However, under closer scrutiny, this inference turns out to be premature: statistical analyses proved that the processing and production differences over different L1 groups occurred due to the differences in RC types, the L1 and L2 Korean speakers' first language background, and the animacy of the head noun.

Moreover, the processing and production differences could also be explained under both competing analyses of Korean relative clauses, the movement of the empty operator and the direct coreferential of the head noun with the clause-internal *pro* (see Section 2.4.3). The most robust implication we can obtain from this study is therefore that the acceptability and interpretation of noun-modifying constructions in Korean heavily rely on the semantics and pragmatics of noun-modifying constructions in Korean, regardless of syntactic constraints such as empty category

types.

In this regard, Yeon & Brown (2010) emphasize that establishing context is especially vital in the case of a language such as Korean, which does not require all complements of a predicate to be present in a sentence and therefore allows relative clauses with multiple possible meanings, as shown in (6.1):

(6.1) chayk-ul sa-n haksayng
book-Acc buy-Past Rel student
a. the student (who) bought a book
b. the student (from whom) (someone) bought a book
c. the student (for whom) (someone) bought a book

(example adopted from Yeon & Brown, 2010)

Among the three translations above, (6.1a), in which the subject of the predicate is the target of relativization, may seem the most likely interpretation. However, when the relative clause (6.1) is embedded in a sentence such as in (6.2), the interpretation would be assuredly as in (6.2b), which is derived from (6.1b) rather than (6.1a) or (6.1c):

(6.2) chayk-ul sa-n haksayng-hantheyse sacen-to sa-ss-da
book-Acc buy-Past Rel student-Dat dictionary-too buy-Past-End
a. ? (I) also bought a dictionary from the student who bought the book.
b. (I) also bought a dictionary from the student from whom (I) bought a book

(example adopted from Yeon & Brown, 2010)

As shown above, different interpretations of noun-modifying clauses are potentially available in Korean. Moreover, the choice between the interpretations largely depends on the interlocutors' knowledge about the semantic and pragmatic relationship between the head noun and the clause, rather than the grammatical function of the head noun in the relative clause construction in Korean.

Accordingly, the findings of the present research together with such salient semantic and pragmatic features of Korean noun-modifying clauses should be considered and applied to teaching Korean as a foreign language (KFL). This will be discussed together with the shortcomings of the current teaching methodology of relative clauses in KFL in the following section.

6.4 Implications for teaching Korean as a foreign language

As discussed in the previous section, relativization in Korean significantly relies on semantic and pragmatic factors other than English or other European languages. In addition, it is evident that the universal nature of the NPAH effect is not vital in L1 and L2 Korean from the research findings in this thesis.

In this respect, an extended look at the current methods of teaching relative clauses in Korean is important for Korean language teachers and researchers as most Korean textbooks published by leading institutions inside and outside Korea adopt very similar methodological patterns: they mostly focus on teaching appropriate modifier forms which signal the tense of the noun-modifying clauses in the order of present, past and future modifiers, as shown in Table 6.1:

Table 6.1. The orders of introduction to modifier forms adopted in some major KFL textbooks

Sogang Korean	Yonsei Korean	Ewha Pathfinder	Integrated Korean	Continuing Korean
[1B Ch2] Noun modifier *-(u)n*, *–nun* for adjectives ↓ [2B Ch1] Present tense modifier *–nun* and Past tense modifier *-(u)n* for verbs ↓ [3A Ch3] Future tense modifier *-(u)l* for verbs	[Korean I Ch6] Present tense modifier *–nun* for verbs ↓ Past tense modifier (u)n for verbs ↓ Future tense modifier *-(u)l* for verbs ↓ Noun modifier *-(u)n* for adjectives	[I Ch12] Noun modifier *-(u)n*, *–nun* for adjectives ↓ [II Ch6] Past tense modifier *-(u)n* for verbs, Present tense modifier *–nun*, and Future tense modifier *-(u)l* for verbs	[Beginners II Ch8] *–nun* ↓ [Beginners II Ch10] *-(u)n , -(u)l* ↓ [Intermediate I Ch1] *-ten*	[Ch19] The modifier *-(u)n*, the progressive modifier *–nun*, and modifier clauses

The major task of teaching relative clauses in Korean has therefore exclusively centred on accurate uses of the modifiers. Considering that acquiring correct modifier forms is indispensable to produce appropriate noun-modifying clauses in Korean accurately, the significance of teaching modifier forms should not be underestimated. However, the main drawback of such a form-focused teaching approach is that the teachers cannot actually observe how the learners process the structure of relative clauses (Ju, 2012).

Returning to the applicability of the NPAH effect to L1 and L2 Korean in terms of

acquiring and processing of RCs, it has been widely assumed that maximal generalization of learning takes place from structures which are typologically more marked to those structures which are typologically less marked, and not the reverse (Eckman, Bell & Nelson, 1988; Doughty, 1991). In other words, by teaching the relativization of less accessible and more marked constituents in the NPAH, learners may be able to generalize this knowledge to more accessible and less marked constituents, which will facilitate their ease of the whole learning procedure of relative clause constructions.

However, the research findings of the experiments in this thesis do not support the NPAH effect in Korean showing no clear distinction in accessibility between relativized grammatical functions in the hierarchy. If Korean is not affected by the NPAH in processing and production of RCs and the learner's first language(s) do show the effect of this hierarchy, or they show completely different patterns of accessibility to RC types, then the correlation between more marked or less marked grammatical functions in the hierarchy cannot be valid between Korean and the learner's first language.

From the results of the present study, it can be concluded that the effect of the implicational hypothesis of accessibility to relative clauses is not universal. Therefore, the syntactic differences of relative clauses should be carefully considered when teaching Korean, especially to L2 Korean learners from typologically different first language backgrounds. Furthermore, it would be also ideal to incorporate semantic and pragmatic aspects of Korean RCs in context-based approaches that more closely represent real-world language usage.

6.5 Summary

The Noun Phrase Accessibility Hierarchy (NPAH) has long been regarded as typologically universal and widely accepted as an account for the acquisition difficulty of relative clause types. However, whether or not the formation and acquisition of East Asian RCs follows the hierarchy has been a question which has been the source of controversy and which has attracted much attention recently. With regard to the NPAH, recent experimental studies on East Asian languages have shown conflicting results although those on European languages generally comply with the prediction of the NPAH. In addition, various factors, such as grammatical functions of head nouns, thematic roles of entities and semantic/pragmatic relations have been mentioned in the literature although their cross-linguistic influence has yet to be completely proved.

The two computer-assisted experiments in this thesis showed that the NPAH effect is not an absolute language universal. Instead, it seems that multiple factors – types of relative clauses, learners' first language background, and animacy – influence L1 and L2 speakers' processing RCs in Korean (Experiment 1, the Listening Comprehension Tasks). However, the contribution of RC types and L1 on RC processing was greater than animacy by implying that the semantic information was not enough to override the preference for object relative clauses. The processing advantage of objects clearly coincides with the prediction made by the Linear Distance Hypothesis, rather than the Structural Distance Hypothesis, by proving that object relative clauses (OR) are easier to process than subject relatives (SR) in prenominal and head-final RCs. Such multiple factors had also significant effects on L1 and L2 speakers' production of RCs in Korean (Experiment 2, the Picture

Description Tasks). It is also possible that L1 and L2 Korean speakers use different types of information, i.e. argument dependency and animacy of entities regarding verb properties, in RC production to ease the complexity of less accessible/more marked RC types by transferring them for other more accessible/less marked RC types.

From the research findings in this thesis, I conclude that there is no such exclusive hierarchical preference for a particular RC type in both processing and producing RCs in L1 and L2 Korean. It is more likely that multiple syntactic and semantic factors influence the RC processing and production and that the interpretation of Korean relative clauses depends on context and pragmatic factors. Further research should be directed at examining the linguistic and pragmatic use of such clauses in real-world Korean using corpus analysis, and developing how the semantic and pragmatic features apply to teaching Korean noun-modifying clauses as a foreign language to improve teaching efficiency. In particular, the relationship between the various experimental methodologies testing typological universals of relative clauses and their results across languages seems to be an interesting target for future research.

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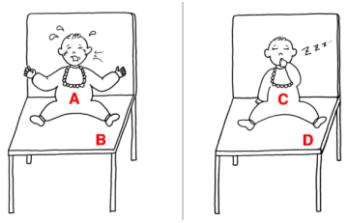
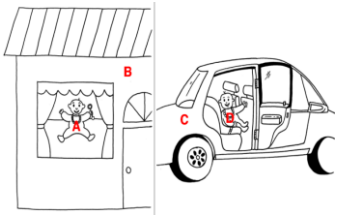
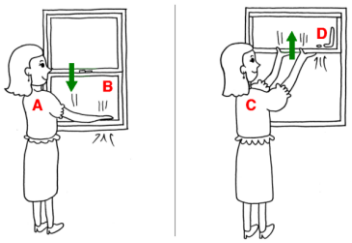
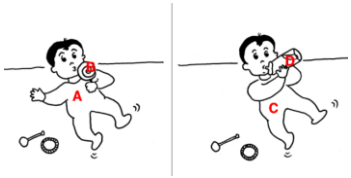
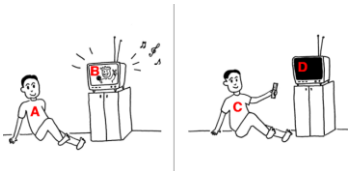
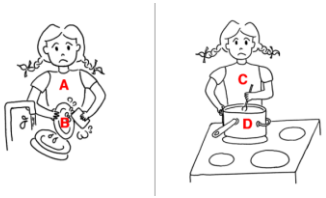
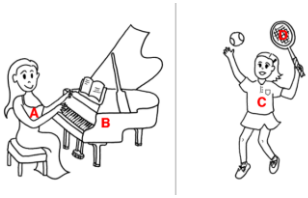
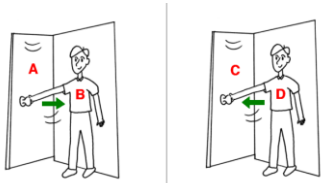
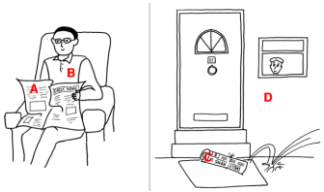
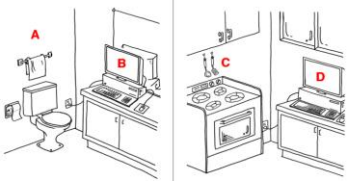
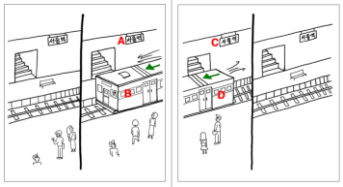
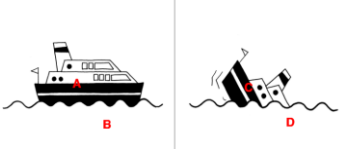
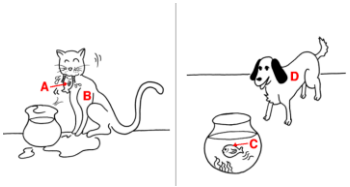
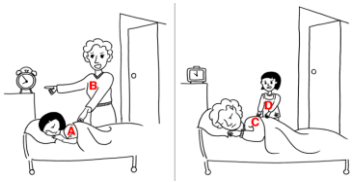
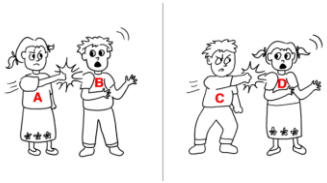
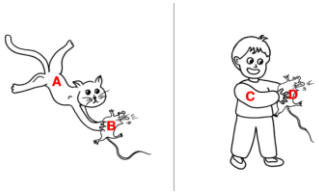
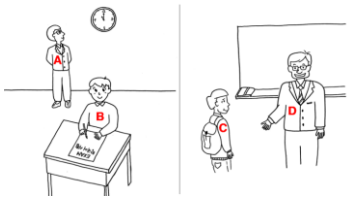
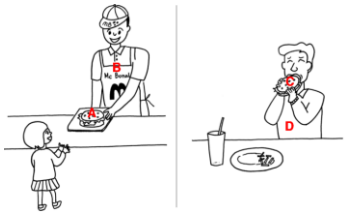
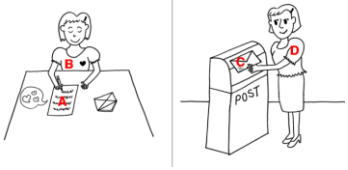
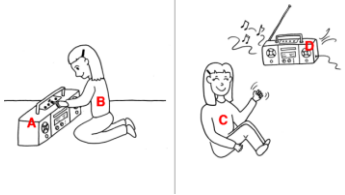
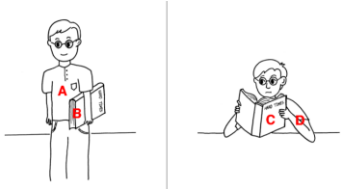
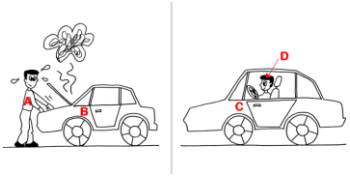
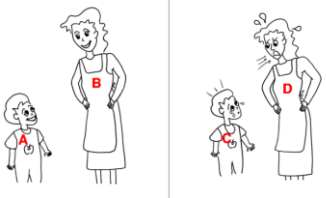
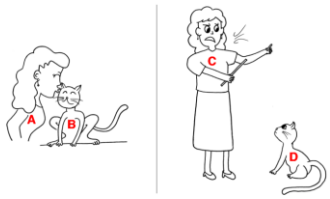
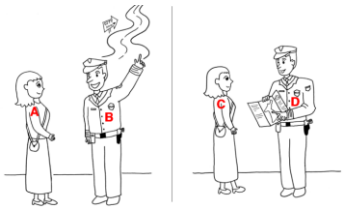
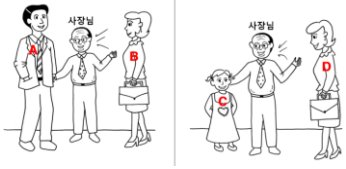
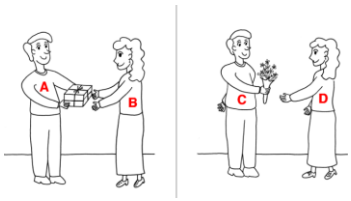
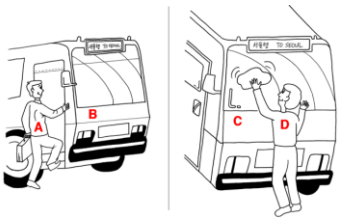
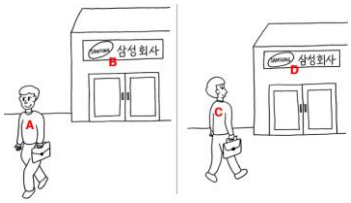
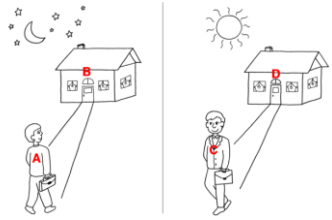
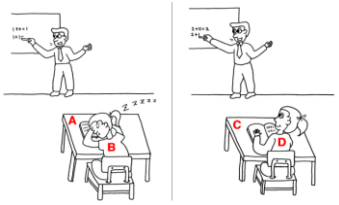
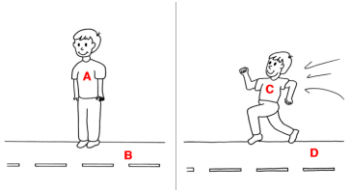
Appendix A Experiment 1: The list of pictures

Example 1 	Example 2 	Example 3 
Picture 1 	Picture 2 	Picture 3 
Picture 4 	Picture 5 	Picture 6 
Picture 7 	Picture 8 	Picture 9 

Picture 10 	Picture 11 	Picture 12 
Picture 13 	Picture 14 	Picture 15 
Picture 16 	Picture 17 	Picture 18 
Picture 19 	Picture 20 	Picture 21 

Picture 22 	Picture 23 	Picture 24 
Picture 25 	Picture 26 	Picture 27 
Picture 28 	Picture 29 	Picture 30 

Appendix B Experiment 1: The list of task items

Listening Comprehension Tasks

Example 1. Uyca-eyse wu-nun aki

"The baby who is crying on the chair" (SU_A)

Example 2. Aki-ka iss-nun cha

"The car which the baby is riding on" (OBL)

Example 3. Yeca-ka tat-nun changmwun

"The window which the woman is closing" (DO_I)

Picture 1. Wuyu-lul masi-nun aki

"The baby who is drinking milk" (SU_A)

Picture 2. Theylleypicen-ul po-nun namca

"The man who is watching TV" (SU_A)

Picture 3. Cepsi-lul takk-nun yeca

"The woman who is washing the dishes" (SU_A)

Picture 4. Phiano-lul chi-nun yeca

"The woman who is playing the piano" (SU_A)

Picture 5. Mwun-ul ye-nun namca

“The man who is opening the door” (SU_A)

Picture 6. Cip-ey paytaltoy-n sinmwun

“The newspaper which is delivered to the house” (SU_I)

Picture 7. Hwacangsil-ey iss-nun khemphyuthe

“The computer which is in the bathroom” (SU_I)

Picture 8. Yek-ey tochakha-nun kicha

“The train which is arriving in the station” (SU_I)

Picture 9. Pata-ey ppaci-nun pay

“The ship which is shrinking in the sea” (SU_I)

Picture 10. San-ey tteleci-nun pihayngki

“The airplane which is crashing/falling into the mountain” (SU_I)

Picture 11. Koyangi-ka mek-nun sayngsen

“The fish which the cat is eating” (DO_A)

Picture 12. Emma-ka kkaywu-nun aki

“The child who the mother is waking up” (DO_A)

Picture 13. Namca-ka ttayli-nun yeca

“The woman who the man is beating” (DO_A)

Picture 14. Koyangi-ka cap-nun cwi

“The mouse which the cat is catching” (DO_A)

Picture 15. Sensayngnim-i manna-nun haksayng

“The student who the teacher is meeting” (DO_A)

Picture 16. Namca-ka mek-nun haympeke

“The hamburger which the man is eating” (DO_I)

Picture 17. Yeca-ka ssu-nun phyenci

“The letter which the woman is writing” (DO_I)

Picture 18. Yeca-ka tut-nun latio

“The radio which the woman is listening to” (DO_I)

Picture 19. Namca-ka ilk-nun chayk

“The book which the man is reading” (DO_I)

Picture 20. Namca-ka kochi-nun cha

“The car which the man is repairing” (DO_I)

Picture 21. Emma-ka hwanay-nun ai

"The child at whom the mother is angry" (IO)

Picture 22. Yeca-ka khisuha-nun koyangi

"The cat (at which) the woman is kissing" (IO)[22]

Picture 23. Kyengchalkwan-i cito-lul poyecwu-nun yeca

"The woman to whom the policeman is showing a map" (IO)

Picture 24. Sacangnim-i namca-lul sokayha-nun yeca

"The woman to whom the chairman is introducing a man" (IO)

Picture 25. Namca-ka kkoch-ul cwu-nun yeca

"The woman to whom the man is giving flowers" (IO)

Picture 26. Namca-ka tha-nun pes

"The bus which the man is getting on"(OBL)

Picture 27. Namca-ka ka-nun hoysa

"The company which the man is going to" (OBL)

Picture 28. Namca-ka tolao-nun cip

"The house which the man is coming back to" (OBL)

[22] In Korean, *khisuhata* 'to kiss' requires an indict object along with an indirect object marker *eykey/hanthey* in spite of that 'to kiss' is a transitive verb and the RC 'the cat the woman is kissing' is a DO RC in English.

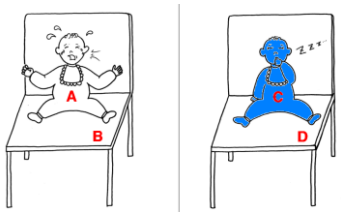
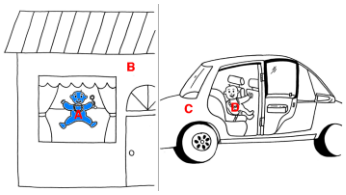
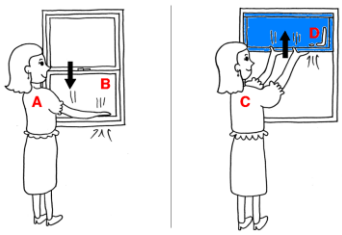
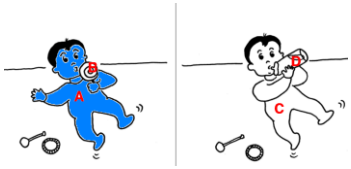
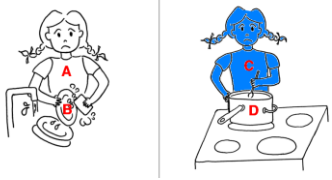
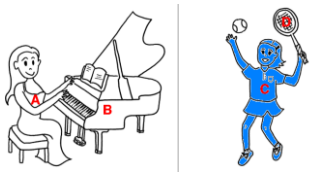
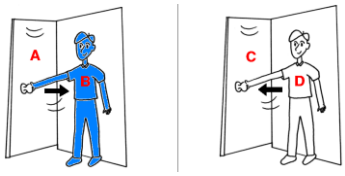
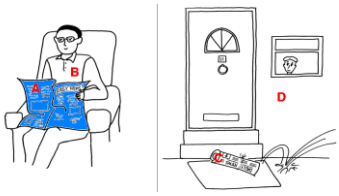
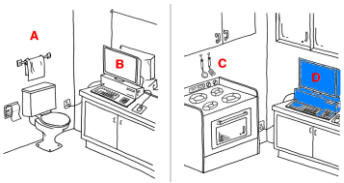
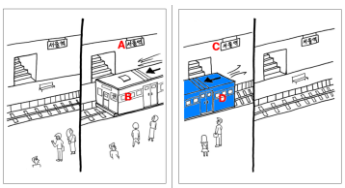
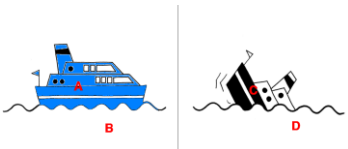
Picture 29. Haksayng-i ca-nun chayksang

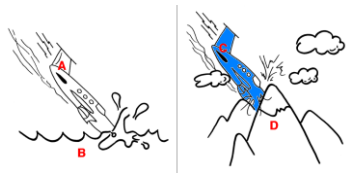
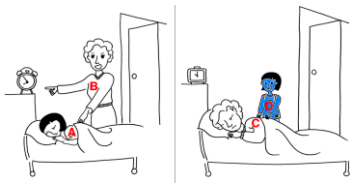
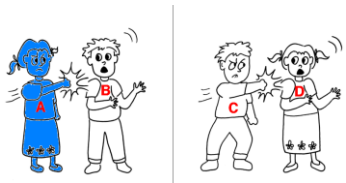
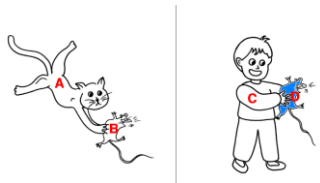
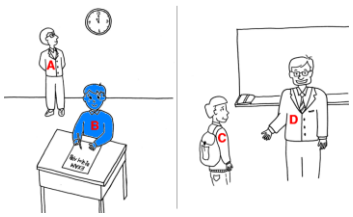
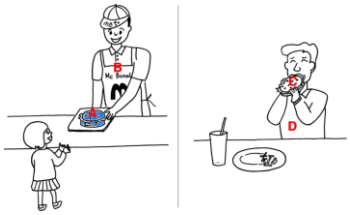
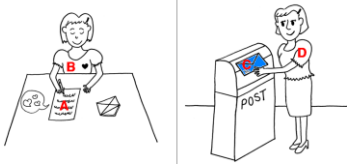
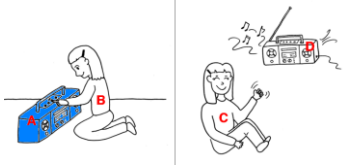
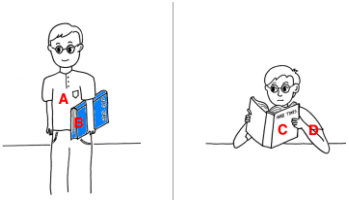
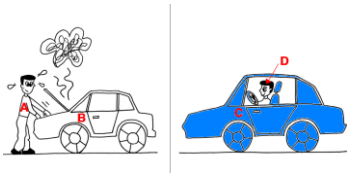
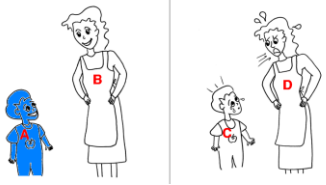
“The desk on which the student is sleeping” (OBL)

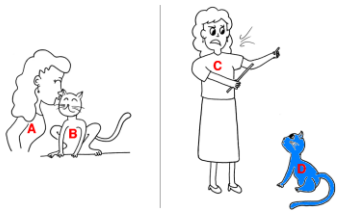
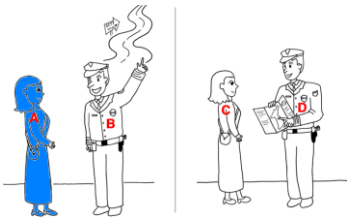
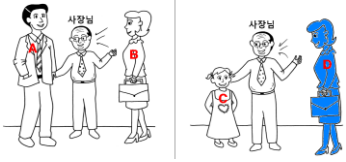
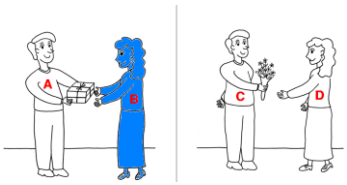
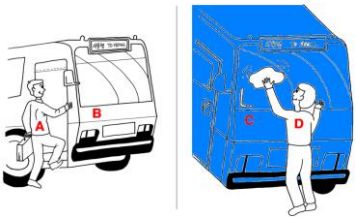
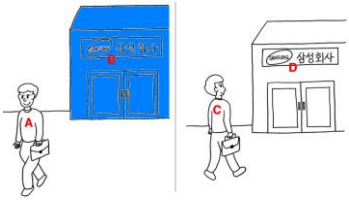
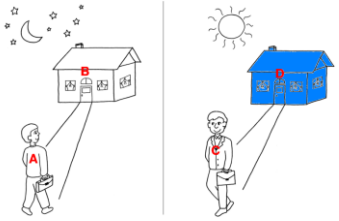
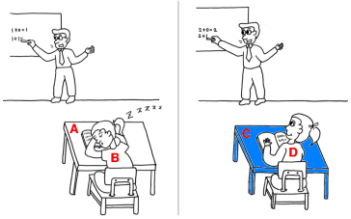
Picture 30. Namca-ka talli-nun kil

“The road on which the man is running” (OBL)

Appendix C Experiment 2: The list of pictures

Example 1 	Example 2 	Example 3 
Picture 1 	Picture 2 	Picture 3 
Picture 4 	Picture 5 	Picture 6 
Picture 7 	Picture 8 	Picture 9 

Picture 10 	Picture 11 	Picture 12 
Picture 13 	Picture 14 	Picture 15 
Picture 16 	Picture 17 	Picture 18 
Picture 19 	Picture 20 	Picture 21 

Picture 22  	Picture 23  	Picture 24 
Picture 25  	Picture 26  	Picture 27 
Picture 28  	Picture 29  	Picture 30